CONSIDERATIONS ON HUMAN EVOLUTION AND ON SPECIES ORIGIN CENTERS

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Abstract. This paper is structured on two mainly sections. In the first section there are presented actual knowledge about the origin of the modern humans, based on the mtDNA and genomic DNA analysis at the fossil and actual human species. In the second section, based on the classical centres of the domesticated of the plants, elaborated by Nikolai I. Vavilov, as well as on the paleontological data, Earth surface evolution, on the migration and dispersion on the Earth surface of the human populations, etc., there are discussed the domestically centres of some culture plants and animals. It is evidenced the importance of the human populations presence and their migration, the size of the considered area, as well as the genetic diversity of the biological sources. It is discussed the domestication process of some culture plants as: wheat, rye, barley, potato, grape vine, garlic, black cumin, etc., as well as of some animals as horse, dog, chicken. The implication of many factors in the domestication process is evidently. A special attention can be accorded to some areas as Fertile Crescent and Central Asiatic Centre. Thus in Central Asiatic Centre there were present, in the same time in the same area, three human genotypes: *Homo sapiens, Homo neanderthalensis*, and *Homo denisovan*. In this region (Central Asia Centre) numerous culture plants (common wheat, peas, lentil, horse bean, onion, garlic, spinach, carrot, grape, apple, pear, a/o), as well as animals (dog, horse, chicken, etc.) were domesticated. The analysis of the species from the culture centres origin, on basis of recent data of genetics and molecular biology, as well as on palaeontology and civilization history data, will permit the thoroughly into the knowledge of life evolution.

Keywords: Human evolution, plants, origin centres.

Rezumat. Consideraţii asupra evoluţiei omului şi a centrelor de origină a speciilor. Această lucrare este structurată pe două părţi principale. În prima secţiune, sunt prezentate cunoştinţele actuale despre originea omului modern, bazată pe analiza mtDNA şi DNA genomic de la speciile fosile şi specia umană actuală. În cea de a doua secţiune, bazat pe centrele clasice de domesticire ale plantelor, elaborate de Nikolai I. Vavilov, precum şi pe datele paleontologice, evoluţia suprafeţei uscatului pe planeta Terra, migraţia şi dispersia populaţiilor umane pe suprafaţa acesteia ş.a., sunt discutate centrele de domesticire ale unor plante de cultură şi animale. Este subliniată importanţa prezenţei populaţiilor umane şi migraţia lor, mărimea arealului considerat, precum şi diversitatea genetică a surselor biologice. Este discutat procesul de domesticire a unor plante de cultură ca: grâu, secară, orz, cartof, negrilică, usturoi, viţă de vie ş.a., precum şi a unor animale precum calul, câinele, găina. Implicarea mai multor factori în procesul de domesticire este evidentă. O atenţie deosebită trebuie acordată unor regiuni precum Fertile Crescent (Cornul Abundenţei) şi Centrul Asia Centrală. Astfel, în centrul Asiei Centrale, au fost prezente în acelaşi timp şi pe aceeaşi suprafaţă trei genotipuri umane: *Homo sapiens, H. neanderthalensis* şi *H. denisovan.* În această regiune (Centrul Asia Centrală), au fost domesticite numeroase plante de cultură (grâul comun, mazărea, lintea, fasolea, usturoiul, ceapa, spanacul, morcovul, strugurii, mărul, părul ş.a.), precum şi animale (câinele, calul, găina ş.a.). Analiza speciilor din centrele de origină, pe baza datelor recente de genetică şi biologie moleculară, a datelor de paleontologie şi istorie a civilizaţiilor, va permite adâncirea cunoaşterii în evoluţia vieţii.

Cuvinte cheie: evoluţia omului, plante, centre de origină.

HOMO EVOLUTION

After the human genome deciphering (DENNIS & GALLANGHER, 2001) the researches of molecular genetics were amplified. Also, there were performed researches meant to decipher the genome from other species, the studies about the phylogenetic relations between species and their evolution. Many studies focussed on the human genome and its evolution, the best incisive being effected by Pääbo Svante and his co-workers. According to the classical conception, the human ancestors lived in Africa (Fig. 1), where the first shape of humanization was discovered.

20 million years ago, it took place the evolutive divergence between Hylobatidae and Hominidae, and 12 million years ago, the evolutive divergence between Pongidae and Hominidae. The first species of the *Homo* genus appeared 2.8 million years ago, and 2 million years ago, the first individuals of the *Homo* genus quitted Africa. The divergence process in the *Homo* genus began 1.8 million years ago.

The homo evolution probably began 8 million years ago, when the divergence between anthropoids and hominids occurred. The first ancestor of the *Homo* genus was probably *Sahelanthropus tchadensis* which lived in the Sahel region 7.2-6.8 million years ago (BRUNET, 2011). After a time, in Africa, it also lived *Ardipithecum kadaba* (5.9 million years) from which *Ardipithecum ramidus* descended (WHITE et al., 2009), a biped humanoid (4.5 million years ago). The ancestor of two fossil humanoids were discovered in the South of Africa: *Australopithecus anamensis* (4.5 million years ago), from which derived many *Paranthropus* species and *Homo habilis*. Related with *Australopithecus anamnesis*, it was *Kenyanthropus platyops* (3.5 million years ago) from which *Homo rudolfensis* derived (2.8 million years ago). *Homo habilis* constituted a nodal species, from which there were considered some evolution pathways. After Science & Vie (2010), *Homo habilis* (2.7 million years ago) was the ancestor of *Homo ergaster* (2 million years ago), which constituted a nodal species in human evolution. On one hand, it derived *Homo heidelbergensis* (living between 950,000 and 270,000 years) and *Homo sapiens*, 180,000 years ago. Also, from *Homo ergaster* as ancestor there derived two evolutive lines for the fossil humanoid species. On one part, it evaluated *Homo neanderthaslensis* (living between 450,000 and 30,000 years ago) and *Homo denisovan* (500,000-120,000 years ago). On the other line, it evaluated *Homo*

erectus (850,000-110,000 years ago) and *Homo floresiensis* (110.000-12.000). COPPENS (2011) proposed another evolution play. The first hominids were of African origin and are represented by *Homo habilis* and *Homo rudolfensis*. Theirs descendents were *Homo ergaster* and *Homo erectus*. From these, in other continents, there evolved other humanoid species. In Europe, it appeared and lived, *Homo heidelbergensis* (ancient Neanderthal) and *Homo neanderthalensis* (Fig. 2). In Asia, it is mentioned *Homo floresiensis*, *Homo denisovan*, and *Homo erectus soloensis* (Homo of Java).

The *Homo sapiens* migrated from Africa (Fig. 3), 100,000 years ago, in Mirror Asia and then in two directions: a part toward Europe (40,000-45,000 years) and another part in Southeast Asia (70,000 years) and in Central Asia (40,000 years). From Central Asia, they migrated in North America (15,000 year) through Behring site and then in South America (12,000 years). From South Asia, they migrated through Polynesia in Australia (50,000 years), other islands from the Pacific and New Zeeland (1,000 years). Thus, until 10,000 years ago, all continents were populated, except the islands from the Pacific Ocean. In their migration they contributed to the living organisms spread, an explanation for the existence of multiple centres of origin for some species.

Svante Pääbo incited by the unexpected, analysed the genome of *Homo nenderthalensis*, versus a genome from an actual *Homo sapiens sapiens*. The first researches were performed in 1997, being identified 1 Mb sequences of genomic DNA from *Homo neanderthaliensis*, from which 99.5 were identical with DNA genomic from actual *Homo sapiens sapiens* (KRINGS et al., 1997). Subsequent, PÄÄBO et al., (2008) obtained all the nuclear DNA extracted from a bone of *Homo neanderthalensis* (fossils from Croatia 38,000 years ago; Fig. 2). They established that 1 – 4 % from *Homo neanderthalensis* DNA is present also in human populations from Europe and Asia. The same DNA is absent at human African populations. They consider that *Homo sapiens* quitted Africa, migrated in Arabia and Middle Orient. In these areas he met *Homo neanderthalensis*, having a hybrid descend, spread in Europe and Asia, 100,000 – 50,000 years ago.

Homo floresiensis was discovered in Flores Islands (Indonesia), in 2003 (Fig. 4). Initially it was discovered a female skeleton, which lived 12,000 – 13,000 years ago, of about 1 m height, small head, of about 30 years old and 25 kg weight. Subsequently, there were discovered another 7 skeletons. They lived in a time period between 95,000 and 12,000 years ago. There were emitted many hypothesis about these humans: (a) an ancient human race; (b) a distinct human species; (c) a pathological shape of *Homo sapiens*; (d) a descend from *Homo erectus*. This island being in a tropical area, the DNA analysis is difficult.

Homo denisovan. In March 2010 in Denisova cave (Altai Krai, Russia), it was discovered a finger bone and tooth from a female juvenile human that lived 41,000 years ago, in a region also inhabited in the same time by Neanderthals and modern humans. The mtDNA analysis from Denisova human is distinct from mtDNA of Neanderthals and modern humans (KRAUSE & PÄÄBO, 2010). The analysis indicated that modern humans, Neanderthals and Denisova hominid, shared a common ancestor around 1 million years ago (KATSNELSON, 2010). Some studies suggest that modern humans coexist with Neanderthals in Europe, and the discovery raises the possibility that Neanderthals, modern Human and Denisova hominid may have co-existed. Probably the Denisova hominid resulted from a previously migration of the humans from Africa. The analysis of mtDNA extracted from a tooth of Denisova hominid, revealed different characteristics similar with to teeth of Homo erectus, indicating a divergence time about 7,500 years before. The estimated time of divergence between Denisovan and Neanderthals is 640,000 years ago, and between both these groups and modern Africans is 804,000 years ago. It was also analysed the DNA from Denisovan and the DNA from different actual human populations (Fig. 5). It was established that 4 – 6% from the DNA of Denisova hominid are present in human Melanesian population from Papua-New Guineas and Bougainville islands. The same DNA is not present in other 50 populations belonging to modern human. Probably the two species present a common ancestor, hawing an independent evolution, 200,000 years ago. Homo Denisovan was breed with ancestors of the Melanesian populations. Also, in this region it developed a rich centre of plant domestication under the action of the hominid populations from the three genotypes (common wheat, peas, lentil, horse bean, onion, garlic, spinach, carrot, grape, apple, pear, etc.).

Other situations. In the Qesem cave, situated near Tel Aviv (Israel), naturally closed 200,000 years ago, there were discovered eight teeth belonging to *Homo neanderthalensis* and *Homo sapiens*. They belong to some fossils with two distinct ages: (a) 300,000-400,000 years and (b) 200,000-300, 000 years. For explanation, there were emitted many hypothesis: (a) they belong to an archaic population from *Homo* genus; (b) fossils of *Homo neanderthalensis*, which evolved differently; (c) these teeth belong to a new human species; (d) *Homo sapiens* appeared more earlier, and thus his migration from Africa to Asia and Europe; (e) the origin sites of the human species is Middle Orient, not Africa.

THE SPECIES ORIGIN CENTRES

The species origin centres are geographical areas where the ancestors of the present domesticated species appeared. The process of speciation was present all over the Earth, in all geological eras. Thus, in the Miocene, *Buxus sempervirens* was a diploid species. Subsequently, it took place a spontaneous doubling of the chromosome number, and the actual tetraploid *Buxus sempervirens* species was formed (CORNEANU et al., 2004). The process of species diversity took place usually in natural conditions. In the case of domesticated species, the human collectivity acted and accelerated this process. Thus the classical "centre of genetic origin" of the domesticated genotypes, represent these

areas where the domesticated genotypes (plant and animals) appeared under action of human collectivities. These centres greatly influenced by human evolution and human spread at the Earth surface.

N. I. VAVILOV developed a theory on the centres of origin of cultivated plants (1961). The **Vavilov Center** (**Vavilov Center of Diversity**) is a region of the world considered to be an original centre for the domestication of plants (VAVILOV, 1961). VAVILOV established that the plants were domesticated in some regions, considered to be the centre of diversity. The **Vavilov centres** are regions where a high diversity of crop wild relatives can be found, representing the natural relatives of domesticated crop plants. After this conception, there appeared eight centres of origin of the domesticated plants (or centres of diversity; Fig. 6).

1) South Mexican and Central American Centre includes the southern sections of Mexico, Guatemala, Honduras, and Costa Rica. Domesticated: maize, common bean, cotton, cherry tomato, cacao, etc.

2) South American Centre 62 plants listed; three sub centres: (2) *Peruvian, Ecuadorean, Bolivian Centre* (potato, tomato, cotton, bean, tobacco, etc.); (2A) ***Chiloe Centre*** (Island near the coast of southern Chile; potato, strawberry); (2B) ***Brazilian-Paraguayan Centre*** (manioc, peanut, etc.).

3) Mediterranean Centre includes the borders of the Mediterranean Sea. 84 domesticated plants: durum wheat, emmer, oats, pea, rape, olive, cabbage, peppermint, black mustard, Baraka, etc.

4) Middle East includes the inner part of Asia Minor, Transcaucasia, Iran, and the highlands of Turkmenistan. 83 domesticated species: einkorn wheat, durum wheat, oats, pear, apple, cherry, alfalfa, lentil, lupine, etc.

5) Ethiopia includes Abyssinia, Eritrea, and part of Somaliland. 38 domesticated species: emmer, barley, sorghum, pearl millet, coffee, etc.

6) Central Asiatic Centre includes Northwest India (Punjab, Northwest Frontier Provinces, and Kashmir), Afghanistan, Tajikistan, Uzbekistan, and western Tian-Shan. 43 domesticated plants: common wheat, peas, lentil, sesame, cotton, onion, garlic, spinach, carrot, pear, grape, apple, etc. We consider, that this centre was the largest, as it included also South Siberia.

7) Indian Centre, with two sub centres: (7) **Indo-Burma:** Main Centre (Hindustan): it includes Assam and Burma, but not Northwest India, Punjab, nor Northwest Frontier Provinces. 117 domesticated plants: rice, pigeon pea, eggplant, cucumber, radish, yam, mango, orange, sugar, oil, fibre plants, stimulants, pepper, etc.; (7A) **Siam-Malaya-Java:** stat Indo-Malayan Centre: it includes Indo-China and the Malay Archipelago. 55 domesticated plants: banana, coconut palm, breadfruit, coconut palm, sugarcane, clove, nutmeg, etc.

8) Chinese Centre, 136 domesticated endemic plants: soybean, onion, cucumber, peach, walnut, apricot, etc.

The Fertile Crescent is a geographical region extended from actual Israel, Jordan, Lebanon, and western Syria into southeastern Turkey and along the Tigris and the Euphrates rivers into Iraq and Iran. In this region, 10,000 years ago, were meet the progenitors of actual cereal species, as wild wheat (*Triticum urartu*, *T. boeoticum*, *T. dicoccoides*, *Aegilops tauschii*), wild barley (*Hordeum spontaneous*) and wild rye *(Secale vavilovii*). The seeds of the wild species (and many others) were meeting in early archaeological sites of the region, and stratigraphic succession. On the actual knowledge, in Fertile Crescent the humans invented agriculture, this region being a genetic centre origin for many culture species (ÖZKAN et al., 2002). In this area, there were met earlier human species (Qesem cave with fossils of *Homo sapiens* with 400,000 years ago).

Triticum sp. (wheat). The first wheat grains dating from 11,000 BC, were found in the Fertile Crescent regions of the Near East. The Archaeological analysis indicates that the wild emmer was cultivated in southern Levant, being meet at Iraq ed-Dubb in northern Jordan dating back as far 9,600 BC (12, 13). The first wheat species were diploids, having 14 chromosomes, with genome AA (*Triticum monococcum*, einkorn) or BB (probably *Triticum searsii*, unknown wild wheat. 8,000 years ago, it took place spontaneous chromosome doubling resulting a tetraploid wheat (*Triticum turgidum*, wild emmer, 2n=28, AABB). Subsequently, hybridization with another diploid wheat species with DD genome (*Triticum tauschii*, or others) occurred, resulting the hexaploid wheat, *Triticum aestivum* (2n=42, AABBDD; Fig. 7).

The archaeological investigations suggest that the wheat was first grown in the Karacadag Mountains in southeastern Turkey. With exception of two grains from Iraq ed-Dubb, the domestication of einkorn took place near the Karacadan Mountain, in the Neolithic period, between 8,600 and 7,500 BC. The researches performed by other researchers in the same region point out that the domesticated emmer wheat was found in the earliest levels of Tell Aswad in the Damascus basin, near mount Hermon in Syria, 8,800 years BC (VAN ZEIST & BAKKER-HEERES, 1982). The wheat cultivation quickly spread in this part of the world: Cultivation in Fertile Crescent after about 8,500 BC; Greece, Cyprus, and India by 6,500 BC; Egypt shortly after 6,000 BC; the Danube plain by 5,500 BC; Germany and Spain by 5,000 BC; England and Scandinavia by 3,000 B.C; China, by 2,000 B.C.

Secale cereale L. (rye), in a wild state, was present in central and eastern Turkey, and in adjacent areas. The domesticated rye was discovered in some Neolithic sites in Turkey. The rye was virtually absent until the Bronze Age in Central Europe (1800-1500 B.C.; ZOHARY & HOPF, 2000). Archaeological arguments underlined the rye presence in the Antique Roman world, along the Rhine, the Danube and in the British Isles. After Pliny the Elder, rye "is a very poor food and only serves to avert starvation", and spelt is mixed into it "to mitigate its better taste, and even then is most unpleasant to the stomach". A controversial aspect is much earlier cultivation of rye, at the Epipalaeolithic site of Tell Abu Hureyra in the Euphrates valley of northern Syria, as well as its cultivation by the antic civilization from the Danube plain, the actual territory of Romania, 4,500-5,000 years BC.

Hordeum vulgare (barley). The origin of barley is debatable, possible originating in Egypt, Ethiopia, the Near East or Tibet. With certitude, barley was among the earliest cultivated plants, in the same period with wheat. The extended area for the barley origin can be due to its use and spread by human populations from the Neolithic period. In the Middle East, barley was grown prior to 10,000 BC. After other authors, barley was domesticated in western Asia before 7,000 BC. From this region, barley cultivation spread to northern Africa, moving along the Nile into Ethiopia, where it became one of the major cereals. It is used in the human and animal alimentation, as well as at the beer production.

Vitis vinifera L. (grape vine) is native to the Mediterranean region, central Europe, and southwestern Asia to northern Iran, from Morocco and Portugal, north to southern Germany. It is cultivated on every continent on the Earth, except Antarctica. The wild grape is *Vitis sylvestris* (or *Vitis vinifera* ssp. *sylvestris*), and the cultivated sorts belong to *Vitis vinifera* ssp. *vinifera*. As biological species, *Vitis vinifera* dated between 130 and 200 million years ago, while its utilisation by people started in the Neolithic period. The domestication of the grape vine took place about 3,500 - 3,000 BC, in southwest Asia, the South Caucasus (Armenia and Georgia), or the Western Black Sea (Bulgaria and Romania). In the northern Iran, there were discovered wine storage jars, of 7,000 years old. The cultivation of the domesticated grape vine, spread in the Old World, in pre-historic or early historic time. The first evidences of grape vine can be found in Gilgamesh, an ancient Sumerian text from the third millennium BC. We can also mention numerous evidences in the ancient world: Egypt, Greeks, Etruscan, Roman, Dacia, etc.

Nigella sativa L. (Baraka, black cumin, etc.), is a medicinal plant used since Antiquity. It is original from the Mediterranean area and Middle Orient. This hypothesis is underlined by the presence of other species belonging to this genus from this area (minimum 14 species with 25 genotypes). In addition, presently, it occurs an evolution and diversification in this genus, in the same area through geographical isolation. Thus the geographical isolation on different islands from the Aegean Sea of the genotypes belonging to *Nigella arvensis* complex, conducted to a speciation process (STRID, 1970). Also, through genetics processes (the chromosomes fusion or fission), it results the chromosome number modification and a speciation process (a mis-division process in *Nigella doerfleri*, analysed by STRID, 1968). After ZOHARY & HOPF (2000), archaeological evidence about the earliest cultivation of *Nigella sativa* 'is still scanty'. Seeds of black cumin were found in the tomb of Egyptian Pharaoh Tutankhamen, who ruled Egypt from 1333-1324 B.C. (the son of Akhenaton and Nefertiti), with the role to assist him in the afterlife. In the Bible, in the book of Isaiah in the Old Testament (Isaiah 28: 25, 27), it is described as the "curative black cumin". In Islam, the seed of *Nigella sativa* is regarded as one of the greatest forms of healing medicine available. Mohammed, Allah's Messenger said about *Nigella sativa* seed ~~as~~ that 'there is not disease for which *Nigella sativa* seed does not provide remedy' (RANDHAWA & AL-GHAMADI, 2002). The seeds have been traditionally used in the Middle East and Southeast Asia countries to treat ailments including asthma, bronchitis, rheumatism and related inflammatory diseases, to increase milk production in nursing mothers, to promote digestion and to fight parasitic infection, as well as against ~~to~~ scorpions and snake wounds. Moreover, the oil has been used to treat skin conditions, as eczema and boils, and to treat cold symptoms; it also has anticancer properties. Researches performed on cpDNA point out an evolutionary process in *Nigella arvensis* alliance from the Aegean Sea area (BITTKAU & COMES, 2005).

Allium sativum L. (garlic) is believed to originate from Central Asia (Kazakhstan, Uzbekistan, and western China), another centre of cultivated plant (MATHON, 1981). This hypothesis is confirmed by phylogenetic analysis based on molecular and biochemical markers, also indicating a secondary diversity centre in the Caucasus. Garlic spread to the Mediterranean area from the ancient times. The existence of two or three origin centres can be explained through its use by primitive human populations, who transported it in their migration: Africa-Middle East (and Mediterranean area) – Caucasus-Central Asia. Garlic spread in the Mediterranean area in ancient times. Also, garlic was grown in tropical Africa (being probably native in this geographical region), in Sahel, and at high elevations in East and southern Africa. Garlic was already grown in Egypt in 1600 BC and in ancient India and China.

Solanum tuberosum L. (potato) originates from a region of the Andes. In southern Peru, from a species in the *Solanum brevicaule* complex, where they were domesticated 7,000-10,000 years BC (SPOONER et al., 2005). Subsequently, following centuries of selective breeding, there are now over a thousand different types of potatoes. This region is also remarked through the presence of some evolved human civilizations. We must mention that in this region there were domesticated many others culture plants as: tomato, bean, tobacco, maize, cotton, cocoa, etc.

Equus ferus caballus (domestic horse). The earliest known member of the Equidae family was the ***Hyracotherium***, which lived between 45 and 55 million years ago, during the Eocene period. From this, it derived the ***Mesohippus***, which lived 32 to 37 million years ago. About 5 million years ago, the modern *Equus* evolved. The proto-horses changed from leaf-eating forest-dwellers to grass-eating inhabitants of semi-arid regions worldwide, including the steppes of Eurasia and the Great Plains of North America. About 15,000 years ago, *Equus ferus* was a widespread Holarctic species. Horse bones from this time period, the late Pleistocene, are found in Eurasia, Beringia, and North America. Yet between 10,000 and 7,600 years ago, the horse became extinct in North America and rare elsewhere, probably due to climate change. The Tarpan or European Wills Horse (*Equus ferrus ferrus*) was found in Europe and much in Asia. It survived in the historical era, but became extinct in 1909, when the last captive sample died in a Zoo Garden, in Russia. At present it was recreated the Tarpan, using horses with outward physical similarities. The only true wild horse alive today is the Przewalski's horse (*Equus ferus przewalskii*), a rare animal known also as the *Mongolian Wild Horse*, *taki* (Mongolian people), or *kirtag* (Kyrgyz people).

Canis familiaris (dog). Studies performed on the genetic distance for mitochondrial DNA on dog and Eurasian wolves (*Canis lupus*), confirmed that wolves represent the exclusive ancestor species to dog. The mitochondrial DNA analysis suggests four independent domestication events (VILA et al., 1997). Studies performed by different researchers, suggest different aspects. SAVOLAINEN et al. (2002) suggest a common origin from a single East Asian gene pool for all dog population, while 18 point to the Middle East as the source of most of the genetic diversity in the domestic dog, and a more likely origin of the domestication events (VAN HOLDT et al., 2010). PANG et al. (2009) in a study performed at the Kunming Institute of Zoology found that the domestic dog is descent from wolves tamed less than 16,300 years ago south of the Yangtze River in China. The domestication process of the wolf occurred through natural selection when Mesolithic human building permanent settlements in which a new ecological niche (middens and landfills) was opened by wolves. These wolves had a commensally relations with humans, feeding on their waste over many generations, with natural selection favouring assertive wolves with shorter flight distance in human presence, and causing physical changes related to the redundancy of features adapted for hunting big game. Although dogs are the most closely to grey wolves (the sequence divergence between they is about 1.8%), there are a number of physical and behavioural differences. Moreover, between different sorts of dogs there are also big differences.

Gallus domesticus (chicken). The domestic chicken ~~is~~ descended primarily from Red Jungle fowl (*Gallus gallus*), but some genes was incorporated into domestic birds through hybridization with the Grey Jungle fowl + (*Gallus sonneratti*; ERICKSON et al., 2008). A study performed by FUMIHITO et al. (1994) point out that it occurred a single domestication in the region of actual Thailand. Recent investigations performed by other authors (LIU et al, 2006; ZEDER et al., 2006), point to multiple material origins, with the clad found in the Americas, Europe, Middle East, and Africa, originating from the Indian peninsula, with a big number of unique heliotypes. The origin site of the chicken was probably in Southern China in 6,000 BC (WEST & ZHOU, 1988); it migrated on the Indus valley and Pakistan, very populated regions. In Romania, the chicken reached about 3,000 BC (KIPLE & ORNELAS, 2000). The research performed by SCHWEITZER (1993), SCHWEITZER et al. (1994), suggest that chickens are the closest living relative of *Tyrannosaurus rex*, as there are similarities in collagen fibres and proteins between the two species.

CONCLUSIONS

The recent paleontological data and researches of molecular genetics suggest the presence of four varieties of humans, among which it took place crossing, resulting viable hybrids.

The number of human forms is possible to be greater, based on the paleontological data from the Qesem cave (Israel), and the origin human to be in other geographical region.

In their migration and spread on the Earth surface, the humanoid groups spread also the domesticated plants and animals.

The genetic origin centres where the domestication process of plants and animals occurred, must present some characteristics: the human presence over an appreciable period time (probably over 10,000 years), an adequate size and optimal life conditions, a rich reserve of germ-plasma with a genetic variability, the human interest for their use, etc.

In Fertile Crescent, as well as in Central Asiatic Centre, there were met ancestors of the domesticated species, and many human populations belonging to different genotypes. They evolved together.

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Received: March 31, 2011
Acceped: August 29, 2011

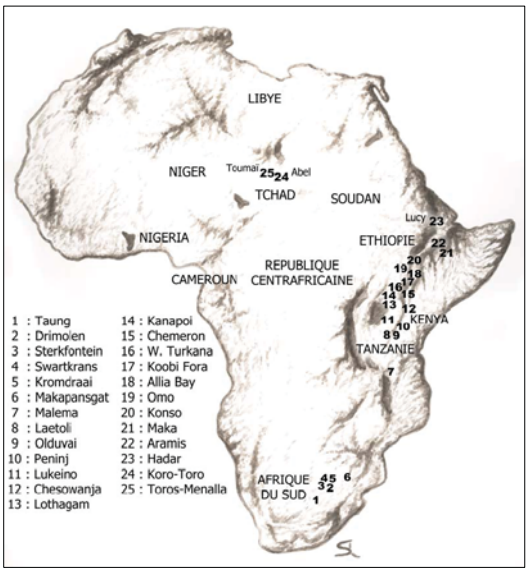

Figure 1. Archaeological locations in Africa (after Science et Vie, 2011).
Figura 1. Situsuri arheologice în Africa (după Science et Vie, 2011).

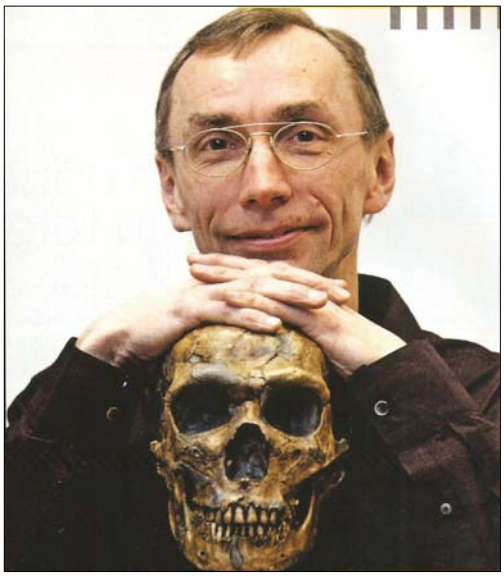

Figure. 2. Svante Pääbo with a Neanderthalian skull (after Science et Vie, 2011).
Figura 2. Svante Pääbo cu un craniu de Neanderthalian (după Science et Vie, 2011).

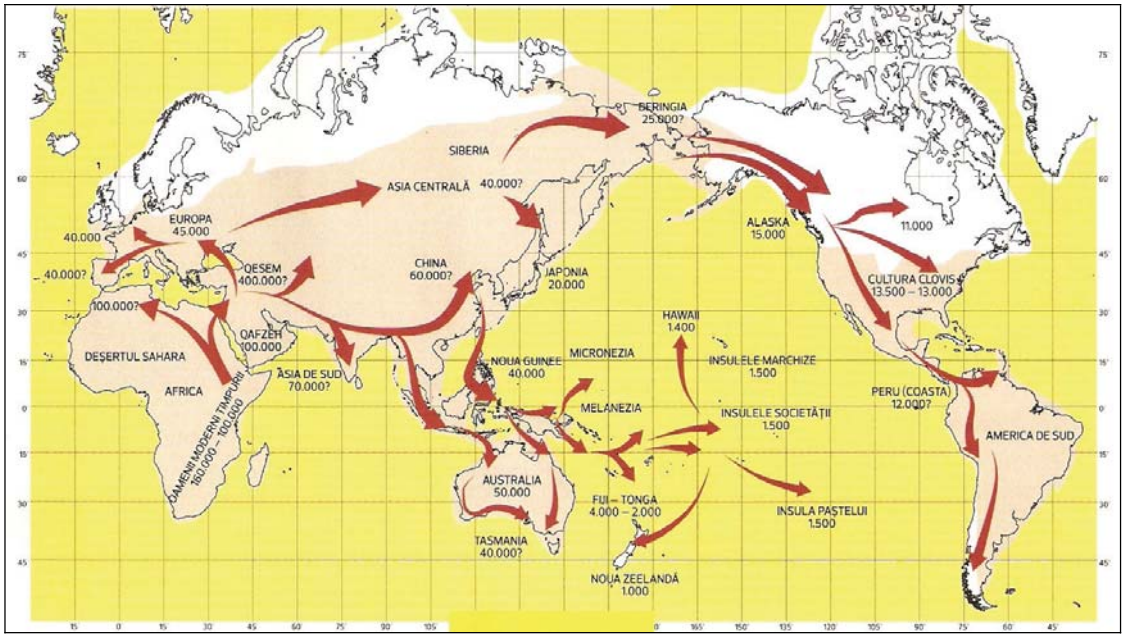

Figure. 3. Homo migration on the Earth surface (after Ştiinţă şi Tehnică, LX, **1**: 68, 2011).
Figura 3. Migraţia omului pe suprafaţa Pământului (după Ştiinţă şi Tehnică, LX, **1**: 68, 2011).

Figure 4. *Homo floresiensis* (after Science et Vie, 2011).
Figura 4. Homo *floresiensis* (după Science et Vie, 2011).

Figure 5. Differences between humane races (after Science et Vie, 2010).
Figura 5. Diferențe între rasele umane (după Science et Vie, 2010).

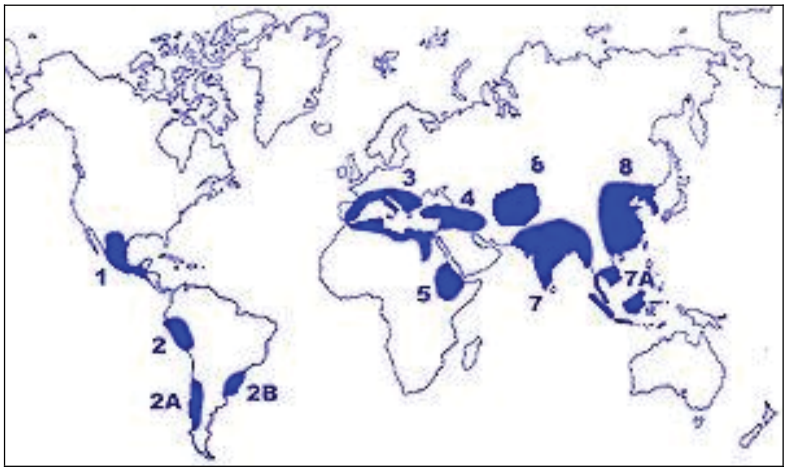

Figure 6. Center of plant origin (modified after LADIZINSKY, 1998). (1) Mexico-Guatemala, (2) Peru-Ecuador-Bolivia, (2A) Southern Chile, (2B) Southern Brazil, (3) Mediterranean, (4) Middle East, (5) Ethiopia, (6) Central Asia, (7) Indo-Burma, (7A) Siam-Malaya-Java, (8) China. / Figura 6. Centre de origine a plantelor (modificat, după LADIZINSKI, 1998).

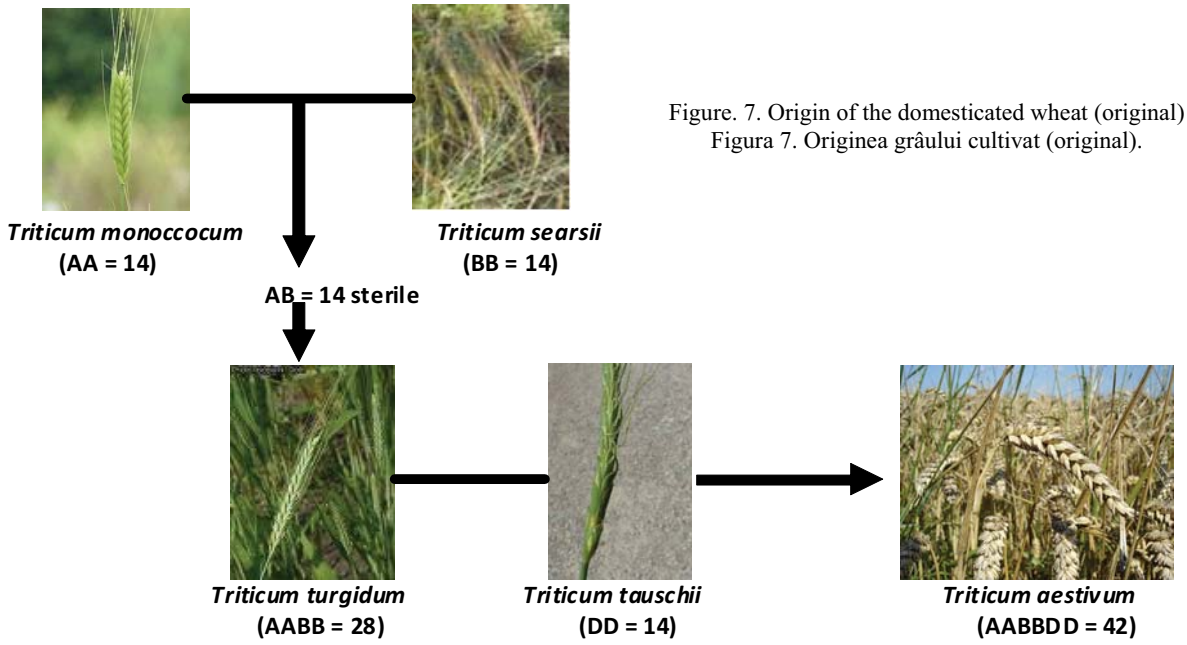

Figure. 7. Origin of the domesticated wheat (original)
Figura 7. Originea grâului cultivat (original).