

ORVOSTÖRTÉNELEM  
MEDICAL HISTORY**Malaria tropica - a coincidence or the fatal fact within the US historical boundaries?****Malaria tropica – véletlen vagy a végzetes tény az USA határain belül?**NEVEN MATERLIJAN<sup>1</sup>, PROF. ANTE ŠKROBONJA<sup>2</sup><sup>1</sup>Croatian Scientific Society for the History of Health Culture, Rijeka, Croatia<sup>2</sup>History of Medicine, Univ. Rijeka School of Medicine, President of the Croatian Scientific Society for the History of Health Culture, Rijeka, Croatia

**Abstract:** the introductory lines recall the role of infectious diseases' epidemics in the past highlighting malaria and its consequences. What follows is the account of the incidence of malaria in the new world, where plasmodium vivax, the agent of malaria tertiana was brought by european colonizers. Later on black slaves from africa brought plasmodium falciparum, or the agent of malaria tropica. While plasmodium vivax spread across the North American continent, plasmodium falciparum reached as far as the 35th parallel, or the approximate boundary of the southern and northern states. The paper puts forward the hypothesis that malaria tropica had an indirect impact on the division into the American North and South, with all the ensuing social, economic, and political consequences. The hypothesis may provide an explanation for the queries about the beginning as well as the aftermath of the American Civil War. In conclusion the authors question the developmental prospects of the USA and the pace of its transformation into the world's industrial and military superpower.

**Key words:** History of medicine, 16th-19th century, malaria, USA, American Civil War;

**Összefoglalás:** A bevezetés viszaidézi a fertőző betegség epidémiák multban játszott szerepét, kiemelve a maláriát és következményeit. Ezt követi a beszámoló malária incidenciájáról az Uj Világban, ahová a plasmodium vivaxot, a malária tertiana okozóját európai gyarmatosítók hurcolták be. Később az afrikai fekete rabszolgák behurcolták a plasmodium falciparumot, a malária tropica okozóját. Míg a plasmodium vivax szétterjedt az észak-amerikai kontinensen, a plasmodium falciparum a 35. szélességi fokig jutott, hozzávetőleg a déli és északi államok határáig. A cikk felveti a hipotézist hogy a maária tropicanak közvetett befolyása volt az amerikai Észak és Dél szétválására, és az összes ezt követő szociális, gazdasági és politikai következményekre. A feltételezés magyarázatot adhat az amerikai polgárháború kezdetére valamint az utóhatására. Befejezésként a szerzők megvitatják az USA fejlődési kilátásait és az átalakulásának a lépéseit a világ ipari és katonai szuperhatalmává

**Kulcs szavak:** orvostörténelem, XVI-XIX. század, malária, USA, amerikai polgárháború

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## Introduction

Although official history has often relativized the role of diseases in the local and particularly general historical development, it is certain that epidemics among populations or armies, as well as diseases of influential individuals have played an exceedingly important role in the flow of history. But while the waves of traditional epidemics of infectious diseases (even the pandemics of 'black death' in the 14th century, syphilis in the 16th century, or cholera in the 19th century) swept over smaller or larger areas and took their toll, endemics which were persistent in the particular area were drastically slowing down or preventing life of the local population. Malaria sets the best example of this. It proved fatal for numerous army leaders and conquerors, ranging from Alexander the Great to the colonizers' expeditions in the tropics. There are many cases in which the environmental change into swampy soil adequate for the development of anopheles led to the annihilation of the cities with longish history.

The proper example is the city of Dvigrad (Ital. Due Castelli) in Istria in Croatia that had coped with several epidemics of the plague or the like from antiquity, but life ceased there in 18th century, after the adjacent river had changed its course and gave way to the fatal swamps (1). On the other hand, many swampy areas were brought to life by the effective land-reclamation and eradication of mosquitoes. We should show reverence for more than three billion people having been killed by malaria up to the present day when malaria has been practically eradicated in many countries. It is certain that there are many unrecognized or insufficiently estimated events of the past on which malaria had a direct or indirect impact, or which diversely correlate with malaria.

### *Malaria in the New World*

This paper is based on the hypothesis that malaria brought from Europe and Africa correlated not only with some of the crucial events in the course of the 19th century on the North American continent, but also that malaria tropica might have indirectly predetermined some of the decisive American divisions, and consequently the American Civil War.

Thanks to historical surveys (2) and the surveys done in the native populations of both Americas (3), we can say with a high degree of probability that malaria was not existent in the New World up to the end of the 15th century, when it was brought by the seamen who had joined Christopher Columbus's expeditions. Thus the autochthonous Anopheline mosquitoes became vectors in the spreading of a new disease among local population, which had not acquired any immunity to malaria.

In the following expeditions in the course of the 16th century, a sort of 'American holocaust' came to pass. Ten to thirty million MesoAmerican Indians are approximated to have died of infectious diseases, or weapons brought to America by the Europeans (3). As

early as in 1522 bishop Bartolomé de Las Casas stated in his renowned work *The Devastation of the Indies: A Brief Account* that over forty years more than 12 million native Indians fell victims to Spanish terror (4).

The Europeans brought malaria to the New World, and it was *Plasmodium vivax* malaria or malaria tertiana having been spread in Europe for a long time. It was present in Spain, Portugal, Italy, the Netherlands, and Britain, i.e. in the countries that had recruited explorers and conquerors.

Ruthless exploitation of the largest scale turned into one of the most atrocious genocides and culturocides in the history. The population of the native MesoIndians had been decreased due to hard work and new diseases; therefore, the colonizers decided to import new labour - the black slaves from Africa, on the recommendation of bishop Las Casas himself (5).

Drastic demographic changes that followed were accompanied by several new morbidogenic phenomena, so that besides the remaining natives white people were also getting sick and dying of malaria. Only much later would it be clear that it was caused by the fact that African slaves had brought to America a far more dangerous parasite, *Plasmodium falciparum*, the agent of malaria tropica (3). And while the Europeans had been coping with 'their' malaria tertiana and its agent *Plasmodium vivax*, on encountering the new agent of the disease they remained helpless for quite a long time.

*Plasmodium vivax* had a very little impact on the health of black slaves imported from Africa because about 95% sub-Saharan Africans suffer from Duffy's syndrome, or erythrocytic cell wall antigen deficiency. Without this antigen in the erythrocytic cell wall, *Plasmodium vivax* simply cannot find its way to the interior erythrocyte; therefore, the carriers of this syndrome are completely immune to *Plasmodium vivax* and they cannot be affected by malaria tertiana, even if the *Plasmodium vivax* parasite enters their blood by transfusion. Black people were completely immune to malaria tertiana in the new conditions, or they had a partial, acquired immunity to malaria tropica (3). Native Indians had practically no immunity whatsoever to any type of malaria, and as early as in the 1640s white people started using quinine, the first effective drug against *Plasmodium*.

### *Malaria tropica in the United States*

Malaria tropica was brought to North America, that is to say to the former English colony of South Carolina in the 1680s, by means of African slaves imported there as labour. The detrimental effect of malaria tropica is validated by the colonial records of the time that register 2883 funerals and 863 christenings. The eighteenth-century English proverb justly said: 'If you want to die quickly, go to Carolina.' The proverb was true as about 86% of white people died before the age of twenty (3).

During the following century malaria tropica spread across the remaining English colonies in North America, in the areas with the adequate climatic conditions, i.e. hot and humid climate.

In the meanwhile the conflicts between English colonial masters and white American settlers sharply intensified to culminate in the war between 1776 and 1783, which resulted in the separation and independence of thirteen new American states. Newly-fledged states were coping with varied economic, political and medical problems, and they all justified slavery within their territories (6).

Over several decades slave-holding became less profitable due to the technological advancement in the Northern states, so that the importation of black slaves gradually decreased. In the South the need for cheap black labour was increasing (7). The reasons for the growth of black labour were not so much motivated by the increase of work load as by the lack of labour due to the high rate of incidence and mortality caused by the imported *Plasmodium falciparum* malaria. On the other hand, a more benign *Plasmodium vivax* imported from Europe was prevalent in the Northern states. This can be confirmed by the fact that unless the disease is cured 5% or less of the infected die of malaria tertiana attacks, while deaths from malaria tropica attacks amount to 20-40% (3,8).

One of the crucial factors in the spreading of malaria tropica is air temperature. *Plasmodium falciparum* develops in the mosquito at temperatures above 18 degrees Centigrade, and if night temperatures drop to lower levels, the development of *Plasmodium* in the mosquito ceases; consequently, *Plasmodium falciparum* thrived and developed in the American South, i.e. south of the 35th parallel, where the conditions for its development were optimum. Only in the extremely hot Summers this boundary moved north, but not farther than the 38th parallel (3).

Due to the fore mentioned reasons, and thanks to their partial, acquired immunity, the black people living in the area of *Plasmodium falciparum* incidence, i.e. south of the 35th parallel, could work in the fields in the hottest months of August and September. Harvest time was the period with the largest incidence of malaria attacks. The number of black slaves in the American South continually increased and the racial structure of the population changed, so that in 1860 more than three million, or the third of American South population of nine million were black. The North of the USA had the population of eighteen million, the majority of them white (7).

When Abraham Lincoln, who was strongly opposed to slavery, was elected the President of the United States of America in 1860, the South started seething. South Carolina (accidentally the state to which malaria tropica had been firstly brought), proclaimed independence and separated from the Union, along with the states of Mississippi, Florida,

Alabama, Georgia, Louisiana and Texas. After the Civil War had begun in 1861, Arkansas, North Carolina and Virginia followed their example, while Kentucky proclaimed its neutrality. During the Civil War that lasted up to 1865 more than 600, 000 soldiers perished on both sides. The heavy casualties resulted not only from the use of advanced weaponry (rifled guns and cannons, mechanical machine-guns, ironclads, sea and land mines, submarines etc.) but, unfortunately, from the relatively old-fashioned, deficient and inadequate medical corps that fell short of the new conditions of warfare. The regular wartime provision of its armed forces brought the Union an unprecedented industrial development that would have otherwise taken at least half a century. (7,9).

### Instead of a discussion or conclusion

The Civil War was not caused by malaria, nor it eventually had any direct impact on its outcome. It was an inevitable conflict of the two groups of states, or the clash of the two social, economic and political conceptions whose geographical boundaries had markedly (could it be said only accidentally?) overlapped with the Northern incidence boundary of *Plasmodium falciparum*, the agent of malaria tropica. If *Plasmodium falciparum* had spread farther to the North, or if the Southerners had successfully coped with the disease, it could have influenced further economic and political development of the United States. We believe that this hypothesis poses a dilemma about the beginning as well as the aftermath of the American Civil War. Would the United States have become the industrial and military superpower any earlier, or later?

P.S. Malaria was eradicated in the USA not earlier than 1950 due to the considerable investment on the part of the state as well as to the unfailing endeavours of medical authorities.

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