Vanguard

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FOCUS ON SCIENCE

ZimCom Publishers for the Zimbabwe Communist Party

COVER PHOTO:

This image of a pair of interacting galaxies called Arp 273 was released by the National Aeronautics and Space Agency (NASA) in the USA to celebrate the 21st Anniversary of the launch of the Hubble Space Telescope in April 1990.

The distorted shape of the larger of the two galaxies is believed to have been caused by gravitational interaction with the smaller galaxy which has passed through it.

These galaxies are approximately 300 million light-years from us.

A light-year is the distance that light can travel in a year. Light travels at a speed of 279,792 kilometres per second.

OUR PLANET:

Our planet Earth is the third nearest to the Sun in our solar system.

Our Sun is an average sized star in the Milky Way Galaxy which is estimated by astronomers to contain at least 200 billion stars.

The Universe is now believed to contain 400 billion galaxies.

Our Earth, then, in terms of the Universe as a whole, is like a grain of sand on the beach.

But our Earth is all we have. We must look after it.

THE HUBBLE SPACE TELESCOPE

Before the launch of the Hubble Space Telescope in 1990, astronomers had to view the Universe through the Earth's atmosphere. The launch of the telescope which is controlled from Earth and sends images back to Earth has expanded our concept of the size and complexity of the Universe immensely.

In the year 1610, the Italian astronomer Galileo pointed a newly-invented telescope towards the planets Jupiter and Saturn and discovered that Jupiter had moons going around it and that Saturn had rings surrounding it. Since then mankind has made incredible strides in space exploration. But none has done more for modern astronomy than the Hubble Space Telescope (HST).

The $8 billion instrument has a primary mirror 2.4 metres in diameter and orbits the Earth at a height of 559 kilometres, hurtling around the Earth at 7.5 kilometres per second.

Named after American astronomer Edwin Hubble (1889-1953) — whose work led to the proposal the cosmos is expanding — the HST was built by the National Aeronautics and Space Agency (NASA) of the United States, with contributions from the European Space Agency, and is operated by the Space Telescope Science Institute.

When HST was launched, studies of distant galaxies were limited to just a few of the brightest examples, and we lacked any clear idea about how galaxies had evolved. As light from distant galaxies can take millions of years to reach us, looking far away also means looking backwards in time; we now have a much better idea of the processes by which galaxies formed and have subsequently grown into the mature forms they have today.

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EDITORIAL: Why do we need to "Focus on Science" when Zimbabweans are struggling to survive?

When Zimbabwe became independent in 1980, the liberation movements, ZAPU and ZANU, claimed to be guided by Marxism-Leninism, the teachings of Marx, Engels and Lenin which its founders referred to as **Scientific Socialism**. For many, 'Marxism-Leninism' is synonymous with the armed national liberation struggle and the violent overthrow of colonialism, imperialism and capitalism. The more important question — what to do after the seizure of power is forgotten, yet scientific socialism gives us the answers. The scientific understanding of both the natural world and of human society as a product of the natural world is essential if we are not only to survive but lead lives which are harmonious both with other humans and with nature.

Zimbabwean Communists believe that a component reason for the current economic collapse in our country is due to the abandonment of the principles of scientific socialism soon after Independence. In fact, we believe that very few members of the leadership ever really understood those principles in the first place — rather they paid lip-service to those principles in order to keep their backers, the Soviet Union and People's China happy and to give the appearance of being advanced and revolutionary to the Zimbabwean people and the outside world.

The historical mission of the Zimbabwe Communist Party, then, is to lead the people of Zimbabwe in *Completing the Liberation of Zimbabwe*, which will be the theme of our 1st Congress and of our new programme.

In order to fulfil this mission, we need to understand scientifically the problems of Zimbabwe and the solutions of those problems in the short, medium and long terms. That is the application of scientific thought to social, economic and political problems. But we also need to understand the world in which we live scientifically and to us our scientific knowledge to improve the conditions under which we live, hence the importance at this time. In fact, in these days of climate change, of global warming, if we do not want to understand the man-made reasons for that change and reverse them, then the probability is that human beings will disappear from the planet Earth and our grandchildren will die.

Being scientifically aware does not always mean the application of high-tech methods to production. Science has frequently been used by capitalism to improve profits at the expense of the environment and the people. The growth of global warming and the increase of extreme weather conditions has destroyed the lives of many through hurricanes, drought and floods. This climate change has been mainly due to the release of carbon dioxide into the atmosphere through the use of fossil fuels (coal and oil). Our seas are full of plastics which are killing marine life.

On the other hand, scientific understanding has helped us replace agricultural chemicals which, in the long term, destroy the land, with organic farming methods which are sustainable. In Zimbabwe, soon after Independence, a very simple invention, the Blair Toilet, led to a marked improvement in rural health.

Cuba, a country with very little natural wealth, organic farming and a concentration on environmental health has produced conditions far superior to any other Latin American country for the majority of its people. Malnutrition does not exist anywhere in Cuba and their infant mortality rate (children dying within the first year of life), is lower than that of the USA.

In China, the move to rapid industrialisation in order to up with the West has led to a huge improvement of living standards but also to severe environmental pollution. However, China has now taken strict measures against polluting factories and is leading in the production of solar panels and wind turbines, and has the biggest reforestation programme in the world. Trees absorb carbon from the atmosphere and store it in their trunks. The growing of trees is a progressive step that even people in small communities can do to reverse global warming.

Contraception and family planning has led to the slowing of population growth, and in some countries, most notably Japan and the former socialist countries of Eastern Europe, the population is actually declining. China, famous for its one-child-per-family programme (now increased to two) has a population which is still growing due to improved health-care for the aged, but by 2030 will go into a rapid decline in numbers as older people die.

A high birth rate is both the consequence of poverty and a creator of poverty. Dangerous levels of pollution are, in large part, due to the fact that world population is already too high.

In 1980, at the time of Independence, Zimbabwe had a recorded population of 7,289,083; according to Worldometers, the estimated population as of 2nd September 2019 was 14,682,726. This of course is without an estimated diaspora population of at least 4 million. It is stated commonly that "at Independence, Zimbabwe was the bread-basket of Africa" and that this no longer the case because of government policies.

Well, government must take a great deal of the blame for failing to plan agriculture properly. But we now have more than double the population to feed that we had at Independence and we have also had an overall decrease in rainfall. When studying the political economy of any country, **all** factors must be taken into account.

Marx, Engels and Lenin all took a keen interest in the scientific discoveries of their day. Engels wrote the *Dialectics of Nature* and *The Part Played by Labour in the Transition from Ape to Man*, a short but very important piece which we have reproduced here. Modern physics during the course of the 20th century progressed in huge leaps.

Einstein wrote his most important work over 100 years ago, but even today, very few people are able to understand it. Two important physicists, the late Stephen Hawking and Lawrence M. Krauss have written works to try to explain the discoveries of modern physics in relation to the history and structure of the Universe and extracts from their works, including the development of scientific thought over the centuries.

One of the ironies of modern-day Africa is that people have been quick to use the most advanced technology of the internet and the cell-phone, the basics of which they do not understand and using that technology are quick to use that technology to deny the science on which it is based.

Without an understanding of the Universe in line with the most advanced science, Africa is doomed to lag behind the rest of the world and to use technology which it has played no part in developing. In our country, Zimbabwe, the vanguard role of the Communist Party goes beyond the every day reality of class struggle to being the leader in the field of promoting scientific thinking.

Ian Beddowes
Editor
Vanguard

GENERAL SECRETARY'S REPORT

1st DECEMBER 2019

We are pleased to announce the holding of the 1st Congress of the Zimbabwe Communist Party in Bulawayo from 19th–22nd December 2019.

The Congress comes at a time when the state continues with its brutality against the workers from the public service unions targetting its leadership.

Zimbabwe, Africa and the world were shocked by the abduction, drugging and torture of Dr Peter Magombeyi, President of the Zimbabwe Hospital Doctors' Association (ZHDA) in September this year. He was to require extensive treatment in South Africa for his injuries. Skilled doctors have been receiving the equivalent of only US$1,100 per month, far from sufficient to feed and clothe them, let alone pay for transport to get to their workplace. Senior medical doctors have joined in solidarity with their junior counterparts in militant action over the response by government is to fire over 480 medical doctors. We are experiencing a silent genocide in our hospitals as patients die in massive numbers under lack of medical treatment as the strike continues.

The government has also intensified its intimidation against members of the Amalgamated Rural Teachers Union of Zimbabwe (ARTUZ) at their work place. A number of these union members are threatened with eviction from teacher's houses they occupy in school premises if they do not renounce their membership of the union. Others have gone for months without pay simply for being elected representatives of the union. The President of ARTUZ, Comrade Obert Msasraure was last week arrested under dubious circumstances. When his lawyer, Doug Coltart went to Harare Central Police Station, to represent him, he was severely beaten for trying to represent his client.

Though the conduct of the Zimbabwe Republic Police (ZRP) has clearly degenerated under the Mnanagagwa/military regime, Zimbabwe Communists have consistently pointed out that the parasitic bourgeoisie has for a long time shown contempt for the skilled workforce in the belief that underpaying — or not paying them at all — impinges on their ability to live a bling lifestyle. The process of effectively deporting Zimbabwe's most skilled people continues.

Street traders — mainly unemployed workers rather than people for whom street trading is a traditional way of life, have also suffered from the brutality of a state machine which no longer pretends to anything else but a violent machine to attack the people in the interests of the looters. Hilton Tafadzwa Tamangani died in custody following torture and beating by police in October 2019. 10 other vendors were arrested with him.

In Mrch this year, Cyclone Idai devastated communities in Manicaland, but most are yet to receive assistance as muich of what was donated has been stolen. The ZCP confirms its solidarity with those community organisations that are working tirelessly to assist the victims of Cylone Idai.

Our Congress comes at a time when the economy continues to be in free fall. Even the middle class in Zimbabwe has collapsed, professionals can barely afford two meals a day. But the tiny political and economic élite continues to live in opulent luxury.

In addition to the ongoing looting, we have the continuing destructive attempt by Minister of Finance Mthuli Ncube to implement neo-liberal moneatarist economics found in textbooks disdredited in 2008 worlwide with the financial collapse of that year. Up to that time, the five largest banks were US. Today, the four largest banks are **state-owned** Chinese banks.

But we do not need to go outside our own boirders to understand the fallacy of putting a well-certificated "professional economist" in charge. We all know that the destruction of Zimbabwe's economy began in earnest when Bernard Chidzero persuaded the economicallyt illiterate ZANU(PF) leadership to introduce the Economic Structral Adjustment Programme (ESAP). In 1961, the great African writer Frantz Fanon in the Chapter of his book *The Wretched of the Eartth*, entitled *The Pitfalls of National Consciousness*, had this to say about Africa's new rulers:

"This economy has always developed outside the limits of their knowledge. They have nothing more than an approximate, bookish acquaintance with the actual and potential resources of their country's soil and mineral deposits; and therefore they can only speak of these resources on a general and abstract plane."

After nearly 40 years of Independence in Zimbabwe, our government and in particular our Minister of Finance still do not understand that it is production and not money which is the basis of the economy. Efforts to appease the IMF and World Bank, the organisations which, with the assistance of Chidzero, as opposed to finding ways to boost production to which we can add the introduction of a new ZimDollar. has no basis in any form of reality. Now we learn that the government of the People's Republivc of China is concerned about the apparent disappearance of funds lent to the Zimbabwe government for development projects.

At the time of the 2009-2013 Government of National Unity, the use of a multi-currency regime led to an improvement of the economy, shortages of currency were met by electronic transfers. The econmy began to grow. With many currencies in use, the black market nearly disappeared. It is now common knowledge that the currency black market revolves around officials of the Reserve Bank of Zimbabwe (RBZ).

Where is common sense?

We are in the middle of the farming season with the effects of climate causing havoc in communities.In this issue of Vanguard, the importance of tackling climate change is dealt with.

Comrades, we need to plant trees! If Zimbabwe is not to become a semi-desert, it is a major priority.

Our Congress will be held under the theme , "Completing the Liberation of Zimbabwe". Over the past two-and-a-half years the ZCP has established its presence on the Zimbabwe political scene. We already has better developed ideology and policies than any other Zimbabwean political formation. The biggest task of our 1st Congress will be to establish structures both of our Party and of the mass movement which will begin to put ideas into action.

As a Communist Party, the ZCP is part of the international working class and anti-imperialist movement. On the African continent, we are of the view that, there is need to co-ordinate our struggles against imperialism and the parasitic bourgeois.

The ZCP congratulates the Sudanese people in overthrowing the dictatorship of Omar al-Bashir and the establishment of an interim government. We note with pride that the Sudanese Communist Party and our other ally, the Sudanese People's National Liberation Movement (North) have played a major role.

In southern Africa the ZCP reaffirms its solidarity with the people of Swaziland against the rotten monarchy and the Tikundla system which supports it. In particular we acknowledge the leading role of the Communist Party of Swaziland in this struggle.

The ZCP supports the people of the Saharawi Arab Democratic Repubklic in their continued armed struggle against the illegal occupation by Morocco.

Also in the north of our continent, the ZCP supports the struggle of the Green Resistance in Libya to restire the Socialist People's Libyan Arab Jamahiriya and the legacy of our martyr Comrade Muammar Gaddafi.

Adjoinig Africa is Palestine whose territory is occupied by the terrorist settler State of Israel which is now trying to evict all Palestinians from their historic homeland. The ZCP calls for a single, secular State of Palestine open to people of all religions or of none, in line with our Comrades of the Palestinian Communist Party.

In Latin America we note the sharpening of class struggle in many countries. We have seen both setbacks and progress in different countries and have produced a statement on the subject.

Following the 1st Congress of the Zimbabwe Communist Party we shall apply to join the International Meeting of Communist and Workers' Parties (IMCWP) and Solidnet; we will continue to press for the revival of the African Left Networking Forum (ALNEF).

FORWARD WITH THE STRUGGLE OF THE ZIMBABWEAN PEOPLE !!

FORWARD WITH THE PAN-AFRICAN STRUGGLE !!

FORWARD WITH PROLETARIAN INTERNATIONALISM !!

LONG LIVE SOCIALISM !!

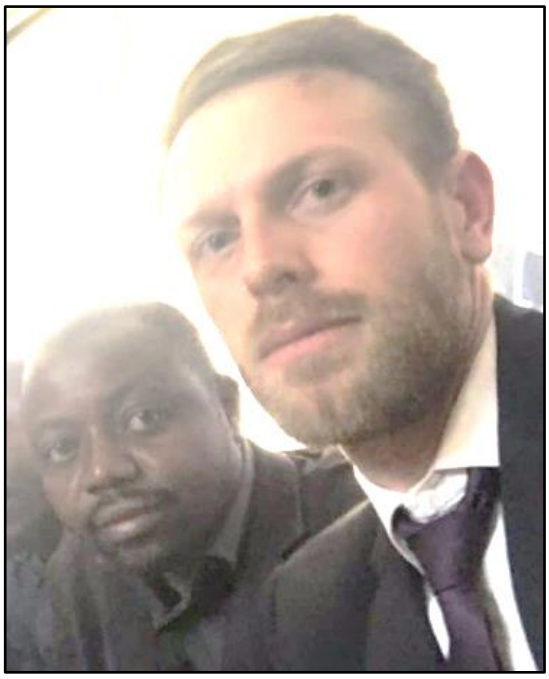
SANDO NE JEKE !!

¡SANDO LE SIKELA !!

HOW LAWYER DOUG COLTART WAS BEATEN UP BY ZIMBABWEAN POLICE

25th NOVEMBER 2019

by David Coltart



DOUG COLTART WITH OBERT MASARAURE

It might surprise some to find an article written by liberal lawyer and MDC Senator David Coltart in a Communist Party journal. We must make it clear that we have a number of sharp disagreements with the ideology and politics of David Coltart; however, we believe that this is an accurate picture of what happened when his son, Doug Coltart, a trade union lawyer working for the Amalgamated Rural Teachers'Union of Zimbabwe (ARTUZ) went to represent Comrade Obert Masaraure, ARTUZ President who had been arrested on spurious charges.

The ZCP regards the arrest of Obert Masaraure and the physical attack on Doug Coltart as a direct attack by the degenerate Zimbabwe Republic Police (ZRP) carried out in the interests of the looting class against the working class and its representatives

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Not a single police officer has been suspended or charged for numerous unlawful assaults on civilians during the last few years. For that reason it is highly unlikely that any action will be taken to investigate the assault of Coltart, nor is there much hope that any disciplinary action will be taken against the officers responsible.

On Saturday afternoon the 23rd November 2019 my son Douglas Coltart was severely assaulted by some 6 members of the Zimbabwe Republic Police at Harare Central police station whilst representing the President of the Amalgamated Rural Teachers' Union of Zimbabwe (ARTUZ), Obert Masaraure. The following are the facts surrounding this incident. I apologise for the length of this post but is important to get the facts out in the public domain.

The Facts

On 23rd November 2019, Mr Obert Masaraure was in central Harare with his wife and their two sons (aged 7 and 3 years) to get a family photograph. His wife was driving the family. Near the intersection of Robert Mugabe Way and George Silundika Avenue, Masaraure got out of the vehicle and sought to direct his wife into a parking bay. Some police officers approached them and accused his wife of blocking traffic. Masaraure engaged the police officers and pointed out that there was no traffic and he was just directing his wife into a parking bay. One of the police officers identified him and indicated that he was wanted at CID Law and Order and at the Police Internal Security Intelligence department. He was also advised that the police were now going to 'fix' him. They let his wife and sons go, and took him to the police station.

At approximately 13.00, Douglas Coltart received a phone call from Masaraure advising that he had been arrested and detained by the ZRP at Harare Central and was requesting legal assistance.

Immediately on receipt of the call, Coltart telephoned Zimbabwe Lawyers for Human Rights (ZLHR) to request their assistance. ZLHR deployed lawyer Mr Jeremiah Bamu. Bamu arrived at Harare Central Police Station at 14.15 and went to the Operations Shed where Masaraure was being held.

As he was about to explain to police officers at the Operations Shed that he was a lawyer and wanted access to Masaraure, Bamu was intercepted by a visibly inebriated Chief Inspector (now identified as Chief Inspector Majongosi) who became aggressive and ordered Bamu to leave. Bamu introduced himself as a lawyer and requested access to Masaraure. The Chief Inspector became even more agitated and shouted that the Law Society Practicing Certificate (which Bamu has shown him) gave no right of access. Bamu refused to leave without either seeing Masaraure or of knowing the name of the arresting detail. The Chief Inspector then introduced himself as Majongosi and advised Bamu to access Masaraure through the cells as he was going to be lodged there. Bamu then attended on the cell controller who advised that he could not assist as Mr Masaraure had not yet been brought into his custody. Having not had lunch Bamu decided to leave temporarily to get lunch and he phoned Coltart to advise him of this.

At approximately 15.00 Coltart arrived at Harare Central with food for Masaraure, having been briefed by Bamu by telephone and advised that the Chief Inspector was drunk. Coltart attended at the Controller's office and was given permission to attend to Masaraure at the Operations Shed. Coltart went to the Operations Shed, introduced himself as lawyer showing his Practicing Certificate, and was given access to Masaraure. Coltart had only just started taking instructions from Masaraure (who at this point had not yet seen a lawyer), when Chief Inspector Majongosi arrived in a belligerent frame of mind. He aggressively instructed Coltart not to talk to Masaraure and that he could only do so from the cells. He advised that Coltart might as well meet Masaraure in court on Monday as he was definitely being detained for two nights. Coltart then advised Chief Inspector Majongosi of the dictates of section 50(1)(a) and (b) of the Constitution and that his client had a Constitutional right to consult with a legal practitioner, without delay, and to be informed of the reason for his arrest at the time of his arrest.

(As an aside section 50(1)(b) of the Zimbabwe Constitution states that "Any person who is arrested must be permitted without delay to consult with a legal practitioner of their choice and must be informed of this right promptly").

Chief Inspector Majongosi refused to say why Masaraure had been arrested and threatened to forcibly remove Coltart. Concerned about the blatant violation of rights and wanting to gather evidence of it, Coltart attempted to record what was happening on his cell phone. Coltart was then manhandled and forcibly removed by several police officers from the Operations Shed. Coltart advised Chief Inspector Majongosi that he was going to make a report to the Controller's Office.

Coltart then proceeded to the Controller's office to make a report, which he did to the officer in charge there. While he was still making the report, suddenly Chief Inspector Majongosi barged into the Controller's office with some 5 or 6 other police officers in full riot gear, including helmets, heavy boots, shin guards and batons and grabbed Coltart. He was then dragged out of the Controller's office by the group of police officers (in full view of the public at the Charge Office front desk) while the officer in charge at the Controller's Office looked on and did nothing to prevent the ensuing assault. Coltart was then dragged into a corridor away from members of the public, where he was assaulted by the group of police officers using boot-clad feet, shin-pads and batons for approximately 5 minutes. He was thrown to the ground and kicked in his back and legs while lying on the ground. A boot was pressed to his head and neck, and his left hand was also crushed. Handcuffs were placed tightly on Coltart and his hands, wrists and arms were then yanked causing deep cuts to his wrists.

He was then forcibly dragged to Chief Inspector Majongosi's office where he was advised by Chief Inspector Majongosi that he was under arrest and was going to be detained for "disorderly conduct" and only taken to court on Monday morning after two nights of detention.

Coltart was repeatedly denied an opportunity to phone his lawyer or a family member, until eventually when the other officers had left, one officer assisted him and allowed him to call his wife. Coltart was handcuffed and detained for over an hour during which time he repeatedly requested that the handcuffs which were cutting into his wrists be loosened but the police officers advised that they could not find the key for the handcuffs. (It is also important to note that Coltart has not yet fully recovered from his previous illegal assault by the police on 23 August 2019 as he still has a loss of sensation in his right hand as a result of damage to the radial nerve caused by overly-tight handcuffs on that occasion). While he was detained, Coltart advised Majongosi that he would be suing Majongosi personally for the assault and illegal detention. Eventually, it was agreed that if Coltart undertook not to sue Chief Inspector Majongosi he would be released without charge, and Coltart was then released from custody at approximately 16.30.

While Coltart was detained Bamu had been unable to locate him, but upon release, Coltart found Bamu and two other lawyers (Mr Mark Rujuwa and Mr Mzokuthula Mbuyisa who had come to provide legal assistance. Bamu and Coltart then engaged the police regarding Masaraure's detention. Chief Inspector Majongosi then advised that he would have let Masaraure go without a charge, but he had already been lodged in cells and could then only be released either to the court or upon paying an admission of guilt fine. Access to him was granted at around 17.00hrs, at which time Mr David Drury and Ms Emma Drury had also arrived. Bamu and Coltart then asked the police what charges Masaraure was facing. They were advised that he was facing charges of "disorderly conduct". On being pressed regarding what facts the police were relying on they stated that it was alleged that Masaraure had said to his arresting police officers "this is pure harassment – you guys are just being used by politicians". Apparently, that was considered by the police to be an element of the offence.

Notwithstanding the lawyers' representations to the police that the charges Masaraure was facing were baseless they were advised that Masaraure would be held in detention over the weekend and brought to court on Monday the 25th November unless he paid an admission of guilt fine. Bamu and Coltart consulted with Masaraure who advised him that his children (presently aged 3 and 7) have been seriously traumatised by witnessing his arrest, especially following his abductions twice this year (on 18th January and on 6th June 2019) from their family home. Masaraure advised that he desperately needed to get out of detention so that he could return to his wife and children to console them. Initially, police said the fine would be ZWL$40 but upon making payment it was increased by the police to ZWL100. Masaraure was finally released from custody at approximately 18.45.

After securing Masaraure's release, Coltart then sought medical attention. Coltart suffered multiple injuries as a result of the assault:

Comment

The assault of a Legal Practitioner acting in the course of his professional duties is unacceptable and a serious breach of criminal law and the Constitution of Zimbabwe. In the normal course of events, such an assault would result in the suspension and possible dismissal of the police officers involved, upon being proved guilty of the offence.

In Zimbabwe police officers in the last few years have been guilty of far worse assaults on civilians than the one perpetrated against Coltart. For example, the assaults by police officers of innocent old men and women in central Harare on Wednesday the 20th November 2019 resulted in far more serious, potentially life-threatening, injuries being inflicted on victims.

Not a single police officer has been suspended or charged for numerous unlawful assaults on civilians during the last few years. For that reason it is highly unlikely that any action will be taken to investigate the assault of Coltart, nor is there much hope that any disciplinary action will be taken against the officers responsible.

It is in this context that the intervention of the Law Society of Zimbabwe is critically important. Unfortunately, the Council of the Law Society of Zimbabwe did not issue any form of complaint, or statement, after the assault of Coltart on the 23rd August 2019. There is no doubt in my mind that this has contributed to the events of this last weekend where the police clearly feel that they can assault Legal Practitioners at will, without any fear of retribution.

The Law Society of Zimbabwe has clear obligations in terms of section 53 of the Legal Practitioners Act to "deal with all matters affecting the interests of legal practitioners" and "to represent the views of the legal profession and to maintain its integrity and status". It also has the implicit obligation to protect the Constitution of Zimbabwe and to ensure that its provisions relating to the rights of accused persons vis a vis their interaction with Legal Practitioners are scrupulously followed and complied with.

DOUG COLTART WITH MEMBERS OF ARTUZ
ABDUCTED WHILE TAKING PART IN A POLITCAL EDUCATION CLASS IN APRIL 2019

Senator David Coltart is the Senior Partner at Webb, Low and Barry Legal Practitioners in Bulawayo, Zimbabwe

Acknowledgements to Africa Legal News for this article.

LAWYERS PROTEST OVER POLICE BRUTALITY

Zimbabwean lawyers on Friday 29th November 2019 marched during a demonstration to protest against harassment and assault of legal practitioners and ordinary citizens.

Dozens of placard waving lawyers gathered outside the High Court in Harare and marched to Home Affairs Minister Kazembe Kazembe's office and to Zimbabwe Republic Police (ZRP) Commissioner-General Godwin Matanga's office in Harare, where they delivered copies of a petition protesting against harassment and assault of ordinary citizens including lawyers by some ZRP officers while executing their professional duties.

In the petition handed over to Aaron Nhepera, the Home Affairs Permanent Secretary and to ZRP spokesperson Assistant Commissioner Paul Nyathi by representatives of Zimbabwe Lawyers for Human Rights and Young Lawyers Association of Zimbabwe, the lawyers protested against the disregard for the law and some constitutional provisions demonstrated by some ZRP officers during the course of the year and more importantly in the past two months.

The legal practitioners cited the heavy-handed approach of some law enforcement agents in October and in November, which resulted in the death in custody of a vendor Hilton Tamangani, the assault of members of the public including women and elderly citizens, the unlawful detention of minors, the assault of journalists, arbitrary arrests of ordinary citizens, the denial of access of legal practitioners to their clients by some ZRP officers and the assault of Douglas Coltart a human rights lawyer in the course of him carrying out his duties at Harare Central Police Station.

The violations of people's rights by some ZRP officers, the lawyers said, will discredit ZRP in the eyes of citizens as well as in the region and internationally.

The lawyers called upon ZRP officers to operate within the requirements of the Constitution and to stop the use of disproportionate force, arbitrary arrests and torture of citizens.

ZRP, the lawyers said, should launch an inquiry into all assaults of members of the public at the hands of some law enforcement agents with the aim of identifying perpetrators and holding them accountable in order to serve justice and prevent recurrence of violations.

The legal practitioners urged government to expedite establishment of an Independent Complaints Mechanism as provided in section 210 of the Constitution, which will be mandated with receiving and investigating complaints from members of the public about misconduct on the part of members of the security services, who include the Police Service and for remedying any harm caused by such misconduct.

ZRP officers, the lawyers said, should be trained on their duties in terms of the Constitution especially the requirement for them not to act in a partisan manner, not to further the interests of any political party or cause, not to prejudice the lawful interests of any political party or cause or violate the fundamental rights or freedoms of any person.

The legal practitioners said ZRP officers should fully comply with the core values underlying the legal profession and the duties of the police and should be educated on the United Nations basic Principles on the Role of Lawye

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STATEMENT ON THE MURDER OF HILTON TAFADZWA TAMANGANI

A WORKING CLASS MARTYR

It is with great shock that the Survival Vendors Union Of Zimbabwe (SVUZ) received the sad news of the passing on of Hilton Tafadzwa Tamangani at Harare Remand Prison due to injuries sustained from torture and brutal assaults by the polic.

This is a testimonial case to the fact that the real crisis in Zimbabwe is human rights abuse of innocent civilians under the Mnangagwa regime. Police, army brutality and abductions of innocent people by state agents points out to the poor level of democracy in the country.

Tamangani was part of a group of the 11 vendors arrested last week in a case involving the discovery of helmets at a building in Harare.

Tamangani succumbed to the torture and passed away on Friday (18th October) night at Harare Remand Prison after he was denied his application for treatment at a private hospital by the State.

The government has failed to create employment for its own citizens but they continue harassing those who are trying to make ends meet on the streets. If the formal sector was functional, the rate of informal sector engagements such as street vending and forex dealing would have been low.

Source: Survival Vendors Union of Zimbabwe (SVUZ)

SVUZ Information Desk
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HARARE 29th NOVEMBER 2019:
LAWYERS WITH BANDAGED HEADS DEMONSTRATE

BULAWAYO PROGRESSIVE RESIDENT'S ASSOCIATION (BPRA) IN PARLIAMENT

Recently, Comrade Benny Moyo, presented a detailed academic paper on the possible devolution of local government financing to Parliament. Benny Moyo is also a memberof the ZCP Politburo. We are not at this stage able to reproduce the whole paper, but hope to do so in a separate document. Below is the Abstract at the beginning of the paper.

CHALLENGES OF FINANCING DEVOLUTION IN ZIMBABWE

ABSTRACT

Despite Zimbabwe's migration from centralism to devolution through the adoption of a new Consitution in 2013, Zimbabwe is yet to develop as a truly devolved state. This analysis sets out to conceptualize fiscal local government autonomy from a comparative perspective which can help inform Zimbanbwe's process of financing devolution. This study is part of a larger effort to understand devolution and potential benefits of devolved local governance architecture. Such an understanding will inform evidence-based policy recommendations aimed at promoting long-term policy reforms. The study further proposes measures to be taken to enhance the capacity of local government authorities to plan, initiate, co-ordinate, manage and execute policies with regards to matters affecting the local people. Although the nature and mechanisms for achieving devolution remain highly debatable, this study submits a conclusion that devolution will remain largely immaterial unless central government devolves some of its tax powers to sub-national governments in order to stimulate healthy fiscal independence and competition among regions.

BPRA MEETING

CHINA AND ZIMBABWE
What happened to the money?

Report from News24
19th NOVEMBER 2019

China has accused the Zimbabwean government of understating the extent of its bilateral support, after budget figures released last week ranked China lowly against other countries.

Finance Minister Mthuli Ncube said last week that China had provided Zimbabwe with US$3.6m in "development support" ranking it below the United States and UK, who both provided US$50m. The EU has provided US$41m in support.

In the wake of the budget, China's embassy in Harare disputed the figure, saying in a statement it was "very different from the situation on the ground." The Embassy said its records show that bilateral financial support to Zimbabwe was far greater, at US$136.8m between the period of January and September.

"The Embassy wishes that the relevant departments of the Zimbabwean government will make comprehensive assessments on the statistics of bilateral supports and accurately reflect its actual situation when formulating budget statement," it said in a statement.

In response the Zimbabwean government tweeted:

"Govt has noted the query raised by @ChineseZimbabwe regarding bilateral aid figures captured in the 2020 National Budget Statement. Necessary consultations are underway to establish a common accounting position. We thank the Chinese Govt for their support.

The Chinese Embassy replied;

"Our understanding is bilateral development support shall include cash aid (i.e. humanitarian emergency assistance for disaster relief), material aid (i.e. donation of rice, medical & agricultural equipments) & funds for major bilateral cooperation projects released by stages."

One month earlier,, the following report came out:

Global Constuctioin Report 29th OCTOBER 2019

Chinese banks have indefinitely suspended funding for three infrastructure projects worth $1.3bn in Zimbabwe after its government withdrew $10m from an escrow account set up for the refurbishment of Robert Mugabe International Airport.

The decision to raid the account, which took place at the beginning of this year, has strained relations between Chinese banks and construction companies and their Zimbabwean partners, while exacerbating Chinese concerns about political risk and exchange rate volatility in the African country.

The suspended projects are the $1.1bn expansion of Hwange coal-fired power station, the $153m airport extension and the $71m NetOne telecoms expansion.

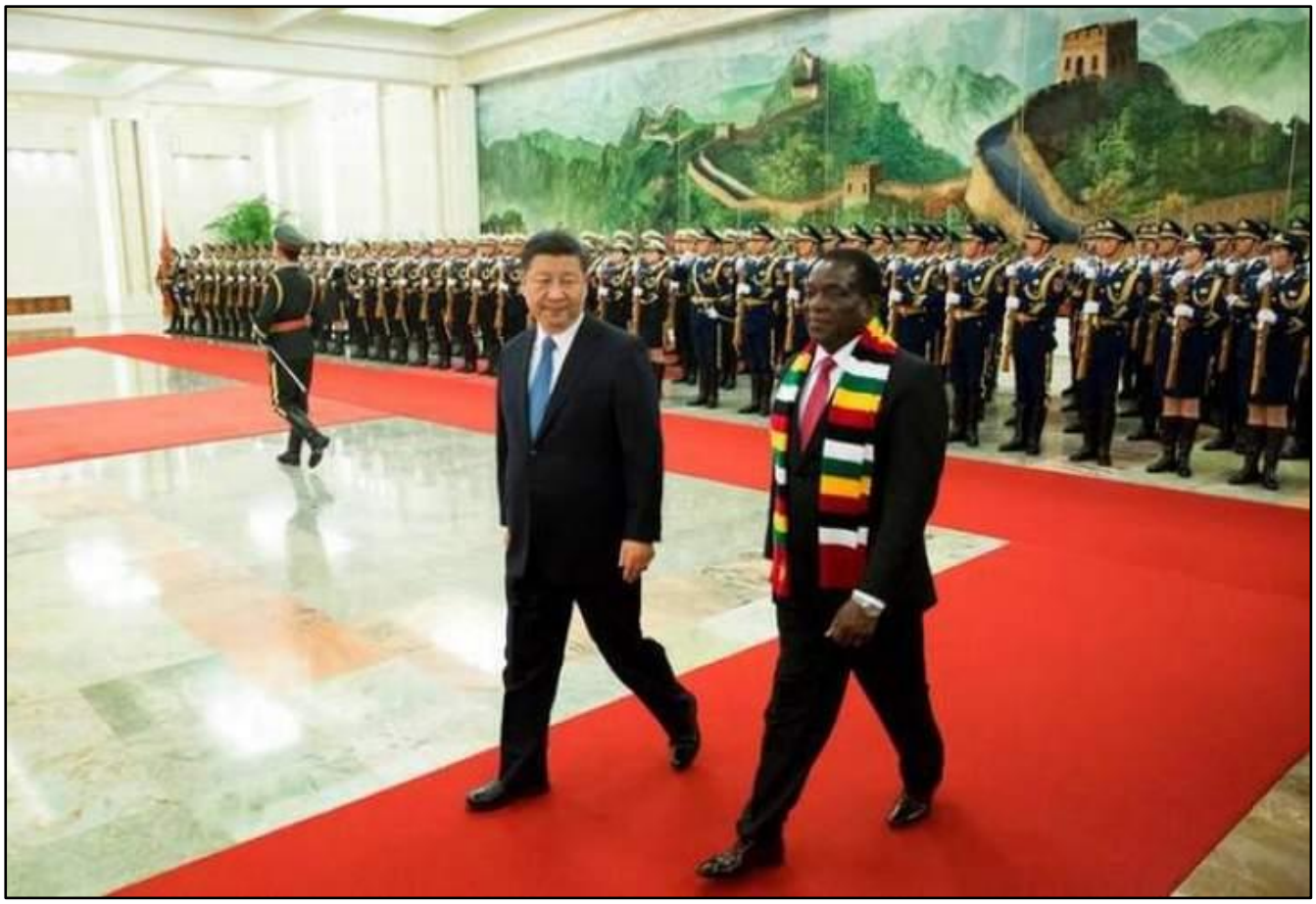
The three-year airport project, begun in 2018, was being undertaken by China Jiangsu International. It was to have modernised the airport, the country's largest, and increased its capacity from 2.5 million to 6 million. The funds from its capital account were seized by the government and converted into local currency by the Reserve Bank of Zimbabwe (RBZ).

The Hwange project, which was to have added 600MW to Zimbabwe's biggest power plant was agreed in 2015 and the $1.1bn loan agreement with China's Export-Import Bank was signed in June last year.

The withdrawal from the escrow account triggered complaints from Jiangsu International and Chinese diplomats, but the money has so far not been returned.

One unnamed official related: "Basically, what happened is that the RBZ raided the escrow account for the airport project and that move destroyed confidence and trust. There have been negotiations for the money to be returned but government is not being honourable enough. The Chinese were patient, but this happened at the beginning of the year and they have now run out of patience. Chinese financial institutions have taken the decision to cease funding the three projects."

The official added: "It's a matter of principle, trust and confidence. How can you trust a pickpocket with your money?"



CAN THIS RELATIONSHIP LAST?

CAUSE AND EFFECTS OF CLIMATE CHANGE

by Christina Nunez

22nd JANUARY 2019

Acknowledgements to National Geographic *for this article.*

Glaciers are melting, sea levels are rising, cloud forests are dying, and wildlife is scrambling to keep pace. It has become clear that humans have caused most of the past century's warming by releasing heat-trapping gases as we power our modern lives. Called greenhouse gases, their levels are higher now than at any time in the last 800,000 years.

We often call the result, "global warming", but it is causing a set of changes to the Earth's climate, or long-term weather patterns, that varies from place to place. While many people think of global warming and climate change as synonyms, scientists use "climate change" when describing the complex shifts now affecting our planet's weather and climate systems — in part because some areas actually get cooler in the short term.

Climate change encompasses not only rising average temperatures but also extreme weather events, shifting wildlife populations and habitats, rising seas, and a range of other impacts. All of those changes are emerging as humans continue to add heat-trapping greenhouse gases to the atmosphere, changing the rhythms of climate that all living things have come to rely on.

What will we do — what **can** we do — to slow this human-caused warming? How will we cope with the changes we've already set into motion? While we struggle to figure it all out, the fate of the Earth as we know it — coasts, forests, farms, and snow-capped mountains — hangs in the balance.

Sunlight shines onto the Earth's surface, where the energy is absorbed and then radiate back into the atmosphere as heat. In the atmosphere, greenhouse gas molecules trap some of the heat, and the rest escapes into space. The more greenhouse gases concentrate in the atmosphere, the more heat gets locked up in the molecules.

Scientists have known about the greenhouse effect since 1824, when Joseph Fourier calculated that the Earth would be much colder if it had no atmosphere. This natural greenhouse effect is what keeps the Earth's climate liveable. Without it, the Earth's surface would be an average of about 33°C, cooler.

In 1895, the Swedish chemist Svante Arrhenius discovered that humans could enhance the greenhouse effect by making carbon dioxide, a greenhouse gas. He kicked off 100 years of climate research that has given us a sophisticated understanding of global warming.

Levels of greenhouse gases have gone up and down over the Earth's history, but they had been fairly constant for the past few thousand years. Global average temperatures had also stayed fairly constant over that time — until the past 150 years. Through the burning of fossil fuels and other activities that have emitted large amounts of greenhouse gases, particularly over the past few decades, humans are now enhancing the greenhouse effect and warming Earth significantly, and in ways that promise many effects, scientists warn.

Aren't temperature changes natural?

Human activity isn't the only factor that affects Earth's climate. Volcanic eruptions and variations in solar radiation from sunspots, solar wind, and the Earth's position relative to the sun also play a role. So do large-scale weather patterns such as El Niño.

But climate models that scientists use to monitor Earth's temperatures take those factors into account. Changes in solar radiation levels as well as minute particles suspended in the atmosphere from volcanic eruptions, for example, have contributed only about two percent to the recent warming effect. The balance comes from greenhouse gases and other human-caused factors, such as land use change.

The short timescale of this recent warming is singular as well. Volcanic eruptions, for example, emit particles that temporarily cool the Earth's surface. But their effect lasts just a few years. Events like El Niño also work on fairly short and predictable cycles. On the other hand, the types of global temperature fluctuations that have contributed to ice ages occur on a cycle of hundreds of thousands of years.

For thousands of years now, emissions of greenhouse gases to the atmosphere have been balanced out by greenhouse gases that are naturally absorbed. As a result, greenhouse gas concentrations and temperatures have been fairly stable, which has allowed human civilization to flourish within a consistent climate.

Greenland is covered with a vast amount of ice — but the ice is melting four times faster than thought, suggesting that Greenland may be approaching a dangerous tipping point, with implications for global sea-level rise.

Now, humans have increased the amount of carbon dioxide in the atmosphere by more than a third since the Industrial Revolution. Changes that have historically taken thousands of years are now happening over the course of decades.

Why does this matter?

The rapid rise in greenhouse gases is a problem because it's changing the climate faster than some living things can adapt to. Also, a new and more unpredictable climate poses unique challenges to all life.

Historically, Earth's climate has regularly shifted between temperatures like those we see today and temperatures cold enough to cover much of North America and Europe with ice. The difference between average global temperatures today and during those ice ages is only about 5°C, and the swings have tended to happen slowly, over hundreds of thousands of years.

But with concentrations of greenhouse gases rising, Earth's remaining ice sheets such as Greenland and Antarctica are starting to melt too. That extra water could raise sea levels significantly, and quickly. By 2050, sea levels are predicted to rise between 30cm and 70cm as glaciers melt.

As the mercury rises, the climate can change in unexpected ways. In addition to sea levels rising, weather can become more extreme. This means more intense major storms, more rain followed by longer and drier droughts — a challenge for growing crops — changes in the ranges in which plants and animals can live, and loss of water supplies that have historically come from glaciers.

Christina Nunez is a writer and frequent contributor to *National Geographic*.

SAME PLACE IN ANTARCTICA 1992-2017 (Acknowledgement: *Times of India* 2018)

TREE PLANTING "HAS MIND-BLOWING POTENTIAL TO TACKLE CLIMATE CRISIS

Research shows that a trillion trees could be planted to capture huge amount of carbon dioxide

by Damian Carrington
Environment Editor, *The Guardian* (London)
5th JULY 2019

Acknowledgements to The Guardian

PLANTING MANGROVES TO PROTECT THE COASTLINE OF INDONESIA

Planting billions of trees across the world is by far the biggest and cheapest way to tackle the climate crisis, according to scientists, who have made the first calculation of how many more trees could be planted without encroaching on crop land or urban areas.

As trees grow, they absorb and store the carbon dioxide emissions that are driving global heating. New research estimates that a worldwide planting programme could remove two-thirds of all the emissions that have been pumped into the atmosphere by human activities, a figure the scientists describe as "mind-blowing".

The analysis found there are 1.7 billion hectares of treeless land on which 1.2 trillion native tree saplings would naturally grow. That area is about 11% of all land and equivalent to the size of the US and China combined. Tropical areas could have 100% tree cover, while others would be more sparsely covered, meaning that on average about half the area would be under tree canopy.

The scientists specifically excluded all fields used to grow crops and urban areas from their analysis. But they did include grazing land, on which the researchers say a few trees can also benefit sheep and cattle.

Let nature heal climate and biodiversity crises, say campaigners

"This new quantitative evaluation shows [forest] restoration isn't just one of our climate change solutions, it is overwhelmingly the top one," said Professor Tom Crowther at the Swiss university ETH Zürich, who led the research. "What blows my mind is the scale. I thought restoration would be in the top 10, but it is overwhelmingly more powerful than all of the other climate change solutions proposed."

Crowther emphasised that it remains vital to reverse the current trends of rising greenhouse gas emissions from fossil fuel burning and forest destruction, and bring them down to zero. He said this is needed to stop the climate crisis becoming even worse and because the forest restoration envisaged would take 50-100 years to have its full effect of removing 200bn tonnes of carbon. But tree planting is "a climate change solution that doesn't require President Trump to immediately start believing in climate change, or scientists to come up with technological solutions to draw carbon dioxide out of the atmosphere", Crowther said. "It is available now, it is the cheapest one possible and every one of us can get involved." Individuals could make a tangible impact by growing trees themselves, donating to forest restoration organisations and avoiding irresponsible companies, he added.

Other scientists agree that carbon will need to be removed from the atmosphere to avoid catastrophic climate impacts and have warned that technological solutions will not work on the vast scale needed.

Jean-François Bastin, also at ETH Zürich, said action was urgently required: "Governments must now factor [tree restoration] into their national strategies."

Christiana Figueres, former UN climate chief and founder of the Global Optimism group, said: "Finally we have an authoritative assessment of how much land we can and should cover with trees without impinging on food production or living areas. This is hugely important blueprint for governments and private sector."

René Castro, assistant-director general at the UN Food and Agriculture Organisation, said: "We now have definitive evidence of the potential land area for re-growing forests, where they could exist and how much carbon they could store."

The study, published in the journal *Science*, determines the potential for tree planting but does not address how a global tree planting programme would be paid for and delivered.

Crowther said: "The most effective projects are doing restoration for 30 US cents a tree. That means we could restore the 1tn trees for US$300 billion, though obviously that means immense efficiency and effectiveness. But it is by far the cheapest solution that has ever been proposed." He said financial incentives to land owners for tree planting are the only way he sees it happening, but he thinks $300 billion would be within reach of a coalition of billionaire philanthropists and the public.

Effective tree-planting could take place across the world, Crowther said: "The potential is literally everywhere — the entire globe. In terms of carbon capture, you get by far your biggest bang for your buck in the tropics [where canopy cover is 100%] but every one of us can get involved." The world's six biggest nations, Russia, Canada, China, the US, Brazil and Australia, contain half the potential restoration sites. Tree planting initiatives already exist, including the Bonn Challenge, backed by 48 nations, aimed at restoring 350 million hectares of forest by 2030. But the study shows that many of these countries have committed to restore less than half the area that could support new forests. "This is a new opportunity for those countries to get it right," said Crowther. "Personally, Brazil would be my dream hotspot to get it right — that would be spectacular."

The research is based on the measurement of the tree cover by hundreds of people in 80,000 high-resolution satellite images from Google Earth. Artificial intelligence computing then combined this data with 10 key soil, topography and climate factors to create a global map of where trees could grow.

This showed that about two-thirds of all land — 8.7 billion hectares — could support forest, and that 5.5billion hectares already has trees. Of the 3.2 billion hectares of treeless land, 1.5 billion hectares is used for growing food, leaving 1.7 billion of potential forest land in areas that were previously degraded or sparsely vegetated.

"This research is excellent," said Joseph Poore, an environmental researcher at the Queen's College, University of Oxford. "It presents an ambitious but essential vision for climate and bio-diversity." But he said many of the reforestation areas identified are currently grazed by livestock including, for example, large parts of Ireland.

"Without freeing up the billions of hectares we use to produce meat and milk, this ambition is not realisable," he said.

Crowther said his work predicted just two to three trees per field for most pasture: "Restoring trees at [low] density is not mutually exclusive with grazing. In fact, many studies suggest sheep and cattle do better if there are a few trees in the field."

Crowther also said the potential to grow trees alongside crops such as coffee, cocoa and berries — called agro-forestry — had not been included in the calculation of tree restoration potential, and neither had hedgerows: "Our estimate of 0.9billion hectares [of canopy cover] is reasonably conservative."
However, some scientists said the estimated amount of carbon that mass tree planting could suck from the air was too high. Professor Simon Lewis, at University College London, said the carbon already in the land before tree planting was not accounted for and that it takes hundreds of years to achieve maximum storage. He pointed to a scenario from the Intergovernmental Panel on Climate Change report of 57billionn tonnes of carbon sequestered by new forests this century.

Other scientists said avoiding monoculture plantation forests and respecting local and indigenous people were crucial to ensuring reforestation succeeds in cutting carbon and boosting wildlife.

Earlier research by Crowther's team calculated that there are currently about 3 trillion trees in the world, which is about half the number that existed before the rise of human civilisation. "We still have a net loss of about 10 billion trees a year," Crowther said.

The Crowther Lab website can be found at: https://gee.ethz.ch/

A few years ago, the country which contributed most to the problem of climate change, the biggest polluter, was, without doubt, the People's Republic of China.

Today, the world's most populous nation is showing the rest of the world how to tackle the problems of pollution. It is not doing it without snags, but without doubt, tremendous advances have been made by China to greatly reduce pollution and its harmful effects to peoples' health, the environment and the problem of climate change and global warming. Of course, other nations have played a significant role in the reduction of pollution, Costa Rica, Germany, Japan among others. But the articles that follow this will concentrate on the world's biggest manufacturing nation and how it is dealing with these problems on an epic scale.

In 1980, China — which had come far since the culmination of the protracted war which began in 1927 and ended when the People's Liberation Army entered Beijing in 1949 — entered on a phase of rapid industrial development referred to as "Socialism with Chinese characteristics."

The period immediately after the People's Liberation Army and the Communist Party of China took power was marked by mass mobilisation of the people and labour-intensive development. Up until 1957, the Soviet Union gave assistance with heavy industry. But by 1980, China was lagging behind the rest of the world technologically and industrially. Chinese industry developed spectacularly quickly in the following years but with the cost of a huge gap between rich and poor and extensive pollution.

At the 18th Congress of the Communist Party of China, the decision was made to seriously address the problem of pollution and huge strides have been made since then. Atmospheric pollution has been offset to a very great degree by massive reforestation. It should also be noted that pollution per head of the population is far lower than that of the USA. The following articles look critically at how China has been pursuing its clean-up policy.

CHINA SHOULD LEAD ON AIR POLLUTION

by

Asit K. Biswas and Kris Hartley

6th JUNE 2019

Ackowledgements to Project Syndicate *for this article.*

Urbanization cannot be stopped, but this does not excuse governments for failing to address air pollution. With considerable resources and capacity for nationwide policy co-ordination, China should be leading the way in developing a sustainable approach to urbanization that can serve as a regional and even global example.

The United Nations expects 68% of the world's population to live in urban areas by 2050. As governments scramble to manage this flood of urban migration, they must address not only basic needs such as housing and employment but also issues impacting liveability and public health — including air pollution.

Now here is this challenge more urgent than in Asia. In recent months, cities like Bangkok, Seoul, Kathmandu and Dhaka have faced major pollution events. But even at their usual levels, 99% of cities in south Asia and 89% in east Asia exceed World Health Organization exposure guidelines. In 2018, Asia was home to all of the world's 30 most polluted cities: 22 in India, five in China, two in Pakistan, and one in Bangladesh.

According to the WHO, polluted air is responsible for seven million premature deaths each year, roughly one-third of which occur in the Asia-Pacific. In China alone, air pollution causes over one million premature deaths annually, according to a 2018 study conducted at the Chinese University of Hong Kong.

In less-developed areas of the region, severe indoor pollution caused by outdated heating and cooking systems poses a particularly severe threat. WHO data indicate that the highest number of deaths *per capita* from indoor pollution in the Asia-Pacific are in Laos, the Philippines, China, and Cambodia.

But polluted air is only one by-product of industrialization. Pollution, absorbed into soil and groundwater, and eventually pumped through household taps, is seeping into the food chain. Rising levels of industrial discharge and agricultural run-off, together with over-exploitation of already-depleted aquifers, are especially alarming in water-stressed regions like northern China.

Urbanization cannot be stopped, but this does not excuse governments for failing to address air-pollution. With considerable resources and capacity for nationwide policy coordination, China should be leading the way in developing a sustainable approach to urbanization that can serve as a regional and even global example.

China has already shown initiative on pollution reduction, which President Xi Jinping has declared one of his signature policy priorities. The authorities regulate car ownership and have earned global praise for electrification of urban bus systems. After a multi-year campaign to reduce the coal industry's emissions, China recently imposed stricter emissions targets on the steel industry. In May 2019, the government deployed almost 1,000 inspectors to 25 cities, targeting rules violations on issues such as water quality and waste management.

Despite evident progress, however, serious challenges persist. Last year, 33 of 39 northern Chinese cities prone to smog missed their government-imposed pollution-abatement targets for the winter. Measurements of PM2.5 (particulate matter) in those cities rose by 13%, on average, over a five-month period beginning in late 2018. Tackling China's persistent pollution problem will require stronger action on three fronts: policy, innovation, and awareness.

From a policy perspective, China has a significant advantage: its central government can quickly enact and enforce policies and regulations. The Ministry of Ecology and Environment (MEE) is reportedly leveraging that advantage to pursue a range of actions such as restricting imports of high-polluting vehicles, encouraging supply-chain restructuring based on lower-emission modes of transport, and boosting pollution-monitoring capacity through satellite technology.

But implementing such policies poses challenges and raises the risk of unintended consequences. For example, while relocating high-polluting industrial facilities has helped to reduce pollution in major urban centers, it has increased pollution in new host locations. More fundamentally, most policies support only pollution abatement, without confronting the urgent need for structural transformation in energy systems and demand patterns.

Such transformation requires decisive action from business. Yet, according to the MEE, schemes to hide regulatory infractions by high-polluting firms are endemic in China and often entail collusion with local governments. By adding environmental protection to the list of factors considered in promoting local and provincial leadership — a worthwhile initiative — China's government may have inadvertently strengthened the incentive to evade monitoring systems.

Beyond establishing the right policies, China's government needs to enforce them more effectively. Among other things, this means closer monitoring of regulatory compliance and ensuring prosecution of violations. This will be costly and politically challenging, but anything less amounts to prioritizing profits over human health.

Innovation can also drive pollution abatement. For example, Shenzhen's urban air mobility (UAM) project, which provides on-demand helicopter transport, leverages the city's well-known innovative capacities while addressing congestion. Initiatives that advance pollution abatement goals while providing fair access to services among residents should be subsidized by central government.

Awareness is the third pillar of a strategy to tackle air pollution. This does not necessarily mean inundating people with news stories about global environmental devastation; on the contrary, that approach can lead to desensitization. Instead, awareness means ensuring that people understand the consequences of air pollution for their health and that of their families. Armed with a new awareness of the risks they face, people can take advantage of online resources like the World Air Quality Index and the State of Global Air to monitor conditions in their cities.

According to the WHO, a staggering 91% of the world's population is exposed to dangerous levels of air pollution. With traditional global powers like the United States and Australia now largely scoffing at environmental concerns, alternative global leadership is badly needed. If China aims to fill this role, it must not only mobilize its formidable resources and innovative capacity but also strengthen its commitment to enforcing the rule of law.

Asit K. Biswas *is Distinguished Visiting Professor of Engineering at the University of Glasgow, Chairman of Water Management International Pte. Ltd. in Singapore, and co-founder of the Third World Center for Water Management. He was a founder of the International Water Resources Association and World Water Council.*

Kris Hartley *is an assistant professor of public policy at The Education University of Hong Kong.*

CHINA'S POLLUTION IS BLOCKING SUNLIGHT FROM SOLAR PANELS

by Johnny Wood

5th AUGUST 2019

Acknowledgements to World Economic Forum *for this article.*

Image: Carlos Barria, Reuters 5th August 2019

As the world's largest consumer of solar power, China's energy industry is attempting to move on from its coal-burning past towards a more sustainable future. But sometimes the past is not easily forgotten. New research published in the journal Nature Energy suggests the country's densely polluted atmosphere is blocking the sun's rays, preventing solar panels from harvesting energy efficiently.

China's rapid economic expansion was largely fuelled by coal, which lifted millions of people out of poverty but also drove up levels of air pollution.

Led by Bart Sweerts of the Institute for Atmospheric and Climate Science in Zurich, Switzerland, a study mapped the effect of China's air pollution on potential solar output from the 1960s up to 2015. The results showed that average solar generation declined by between 11%-15% over the period. Researchers forecast that a return to the air-quality levels of the 1960s could result in an increase in solar electricity harvests of more than 12%.

Economic loss is just one cost of pollution. In terms of human health, long-term exposure to toxic air increases the likelihood of strokes, lung disease, lung cancer and heart attacks. Air pollution is the fourth-highest cause of death in the world, after smoking, high blood pressure and poor diet. According to the World Health Organisation, 90% of the global population breathes air containing high levels of pollutants. Every year, the problem contributes to more than 7 million deaths, with exposure highest in developing countries.

China has the world's second highest number of pollution-related deaths, after India. But China is taking steps to tackle its pollution problems.

As far back as the 2008 Beijing Olympics, measures were put in place to improve the capital's air quality. Heavy environmental regulation saw a 30% improvement in just one year, which resulted in a corresponding drop in cardio and respiratory disease among Beijing residents.

In 2013, China set about cleaning up the air quality of its cities. The sources of air pollution and toxic rain were identified, which included traffic and factory emissions as well as the practice of straw burning on farms. Strong enforcement and better regulation led to factories relocating away from populated areas, while some heavy-polluting plants were closed. To prevent farmers burning straw, they were given government subsidies to encourage them to recycle it instead.

But China relies heavily on manufacturing, and the cost of suspending production and relocating or shutting down companies can be high. A similar problem exists in many developing countries faced with balancing income, growth and the population's health.

China's solution is to channel new infrastructure investment into renewable energy technologies. While International Energy Agency data shows that coal accounted for approximately 60% of China's energy mix in 2016, compared to just 5% for solar power, things are changing. The future lies in diversifying China's energy landscape into clean energy-generating sources like solar power, wind farms, hydro and bio-energy. The country is already a world leader in solar power capacity, a market that is predicted to grow to double that of the US by 2024. While coal continues to play a key role in the country's energy landscape, it is set to fall from two-thirds of the total power mix today to just 40% by 2040.

A recent report predicts that fossil fuels such as oil and gas will continue to dominate the world's energy use through to 2050. While renewable technologies are set to grow by four to five times faster than other power sources.

A cleaner energy mix bodes well for China's long-term air quality, as it will allow the burgeoning solar sector to harness sunshine more efficiently. The country has achieved a lot in its fight against pollution, but there is still a long way to go.

CHINA'S REFORESTATION EFFORTS SIGNIFICANTLY IMPACT GLOBAL CARBON EMISSION REDUCTION

Article and photo from **XINHUANET** *1st September 2019*

MEMBERS OF HAOJINXIANG AFFORESTATION TEAM BUILD FIREBREAK XINGTAI COUNTY, HEBEI PROVINCE 30th AUGUST 2017

The world has become a greener place than it was 20 years ago, largely thanks to China's reforestation efforts that are ambitious enough to have a significant impact on the global mission of cutting carbon emissions. Every 21st March, the United Nations (UN) raises awareness of the importance of all types of forests, offering an opportunity for countries to reflect on their afforestation efforts. China's progress is noteworthy. A recent Boston University study tracking NASA satellites shows that over the last two decades, "the greening of the planet represents an increase in leaf area on plants and trees equivalent to the area covered by all the Amazon rainforests," with China and India leading the charge. The study also finds the world is getting greener overall, and China alone accounts for 25% of the global net increase in leaf area although the country holds only 6.6% of the global vegetated area.

As a country that once suffered severe desertification, China's progress is stunning and marks a significant contribution to the global community. In 2018, China planted 7.07 million hectares of trees, and the country is home to the world's largest man-made forest.

Report by Chen Lei

FOREST STUDY IN CHINA FINDS MIX OF TREES CAN ABSORB TWICE AS MUCH CARBON AS AREAS WITH ONE SPECIES

by Alice Shen
5th OCTOBER 2018

Forests with a diverse mix of trees can absorb more than twice as much carbon as areas with just a single species, research carried out in eastern China has found — a discovery that could help in the fight against climate change.

More than 150,000 trees were planted on a hillside in Jiangxi province in 2009 for the study. Over eight years, researchers found that an average of 32 tonnes of carbon was absorbed per hectare in the above-ground biomass — or living organisms — of the species-rich forest, according to the results published in *Science* on Friday. Single-species forests, in contrast, captured an average of 12 tonnes of carbon per hectare. The experiment near Xingangshan, was the first involving a large cultivated forest to find out whether a greater diversity of tree species leads to increased greenhouse gas absorption, a process that can help to mitigate climate change.

More than 60 scientists from China, Switzerland and Germany were involved in the research, testing a hypothesis based on observations in the field.

"By only observing natural forests, it was impossible to conclude that higher biodiversity was the cause of the higher productivity [absorption of carbon]," said Ma Keping, one of four lead authors of the study and a botanist with the Chinese Academy of Sciences.

"By planting 150,000 trees ourselves, we could control the conditions and prove that a forest with a large number of tree species is more productive than a monoculture," Ma said.

CHINA IS RECLAIMING THE DESERT

www.news.cn
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ETHIOPIA'S AMBITIOUS REFORESTATION INITIATIVE GAINS MOMENTUM

25th JULY 2019

More than 2.6 billion seedlings have been planted across Ethiopia during the past three months as the East African country shore up the momentum to regain its lost forest resources.

According to the Ethiopian Ministry of Agriculture, the 2.6 billion seedlings have been planted across the country as part of a nationwide project that aspires to see the plantation of 4 billion seedlings during the second half of the current Ethiopian physical year.

More than 60% of the target has been already met, said the ministry.

The national 4 billion trees planting project, which was officially kicked off by the Ethiopian Prime Minister Abiy Ahmed on 26th May this year, "is set to mobilize national reforestation program of planting 40 tree seedlings per head," said the ministry.

AMBITIOUS INITIATIVE

The 4 billion trees planting project was launched amid the Ethiopian government's call to promote reforestation efforts, and eventually bring an end to the rising deforestation, which the Ethiopian government frequently labeled as "a daunting challenge" to the country's green economy strategy.

The Ethiopian prime minister had also recently launched the planting of 200 million trees in a single day, which is slated for 29th July — an initiative which is expected to break a world record so far held by India on planting a large number of tree seedlings in a single day.

As the country set to hold the 200 million saplings planting initiative on Monday, the Ethiopian Ministry of Agriculture also on Thursday announced that the distribution of the planned 200 million seedlings — most of which are said to be indigenous tree species — will be completed on Friday throughout the country.

"Nationwide monitoring of planted seedlings will be conducted to ensure that the planted trees would be grown," Ethiopian Minister of Agriculture Umar Hussen said on Thursday. "This will continue even in the future to identify the success rate of the planted seedlings in a bid to promote those who nurtured the planted seedlings as articulated through the national initiative," the agriculture minister added. Noting the government-led reforestation initiative as a "critical imprtus" for Ethiopia's aspiration towards green economy, Hussen also said that the country "had lost billions of trees and forest resources over the past decades."

FRIENDSHIP PROJECT

Amid the Ethiopian government's call to support the national tree planting initiative, Ethiopian and Chinese officials have hailed joint efforts to achieve the East African country's 4 billion trees planting project.

As part of the joint reforestation efforts, a tree planting program was held earlier this week in the premises of the Ethiopia-Djibouti Railway main building on the outskirts of Ethiopia's capital Addis Ababa, and was attended by Chinese and Ethiopian officials.

Tilahun Sarka, Director General of the Ethiopia-Djibouti Railway Share Company (EDRSC), said Ethiopia and China have worked together in various fields, with the co-operation on the tree planting initiative serving as the latest example of the expanding bilateral ties between the two nations.

"Today we're here to share the national vision of planting 4 billion trees in Ethiopia, the vision of our Prime Minister Abiy Ahmed," said Sarka, adding "The railway is not only Ethiopia-Djibouti Railway, but it's also the friendship project of China, Ethiopia and Djibouti."

"As you know this is a standard gauge electrified railway which is using renewable, environmentally friendly energy. So, we are the best example of an environmentally friendly project," Sarka added.

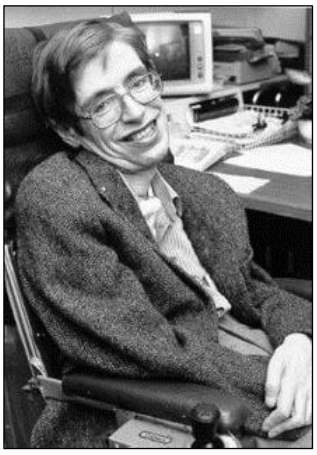
Zhang Zhenhai, General Manager of the CREC-CCECC Joint Venture, a management contractor of Ethiopia-Djibouti Railway, also stressed his company's readiness to help Ethiopia achieve its green economy strategy, including the 4 billion trees planting initiative. "As a Chinese company in Ethiopia, we thought we should contribute from our side for this nice country. We're working together with Ethiopia-Djibouti Railway to achieve this tree planting program," Zhang told Xinhua during the tree planting event on Saturday.

Zhang, who noted that China has its own green economy strategy that encompasses tree planting initiatives, also commended Ethiopia for starting its own tree planting initiative. "China has a similar kind of program, running from the national level up to the ordinary people... China promotes individuals as well as companies to plant trees," said Zhang.

OUR PICTURE OF THE UNIVERSE

This is a slightly abridged version of Chapter 1 of the best-selling book

A Brief History of Time by Stephen Hawking (1988)

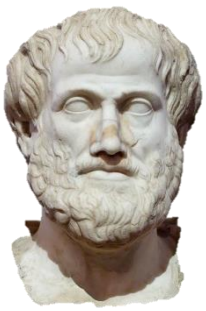


Stephen Hawking (1942-2018)

A well-known scientist (some say it was Bertrand Russell) once gave a public lecture on astronomy. He described how the Earth orbits around the Sun and how the Sun, in turn, orbits around the centre of a vast collection of stars called our galaxy. At the end of the lecture, a little old lady at the back of the room got up and said: "What you have told us is rubbish. The world is really a flat plate supported on the back of a giant tortoise." The scientist gave a superior smile before replying, "What is the tortoise standing on." "You're very clever, young man, very clever," said the old lady. "But it's turtles all the way down!"

Most people would find the picture of our Universe as an infinite tower of tortoises rather ridiculous, but why do we think we know better? What do we know about the Universe, and how do we know it? Where did the Universe come from, and where is it going? Did the Universe have a beginning, and if so, what happened **before** then? What is the nature of time? Will it ever come to an end? Can we go back in time?

Recent breakthroughs in physics, made possible in part by fantastic new technologies, suggest answers to some of these longstanding questions. Someday these answers may seem as obvious to us as the Earth orbiting the Sun — or perhaps as ridiculous as a tower of tortoises. Only time (whatever that may be) will tell.



Aristotle 384-322 BCE

As long ago as 340 BCE the Greek philosopher Aristotle, in his book *On the Heavens,* was able to put forward two good arguments for believing that the Earth was a round sphere rather than a flat plate.

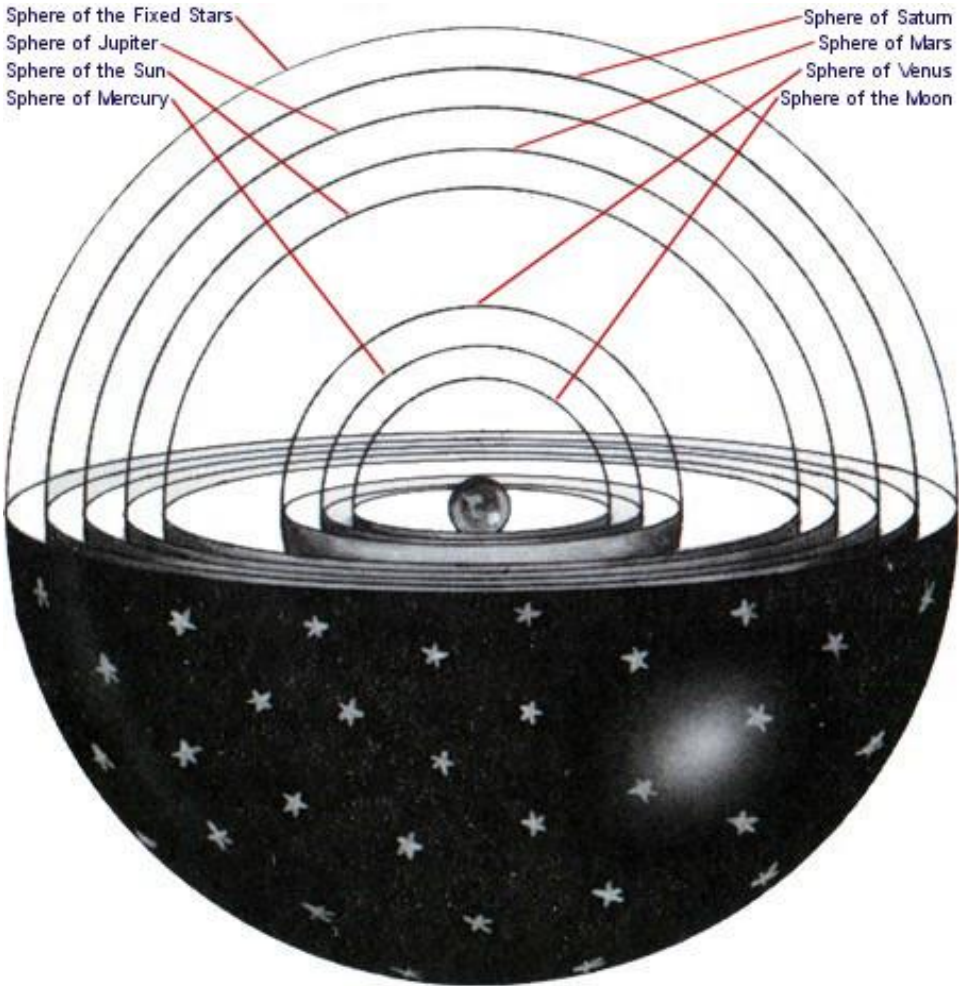
First, he realised that eclipses of the Moon were caused by the Earth coming between the Sun and the Moon. The Earth's shadow on the Moon was always round, which would be true only if the Earth was spherical. If the Earth had been a flat disk, the shadow would have been elongated and elliptical, unless the eclipse always occurred at a time when the Sun was directly under the centre of the disk.

Second, the Greeks knew from their travels that the North Star appeared lower in the sky when viewed in the south than it did in more northerly regions. (Since the North Star lies over the North Pole, it appears to be directly above an observer at the North Pole, but to someone looking from the Equator, it appears to lie just at the horizon. From the difference in the apparent position of the North Star in Egypt and Greece, Aristotle even quoted an estimate that the distance around the Earth was 400,000 stadia. It is not known exactly what length a stadium was, but it may have been about 200 metres, which would make Aristotle's estimate about twice the currently accepted figure.

The Greeks even had a third argument that the Earth must be round, for why else does one first see the sails of a ship coming over the horizon, and only later see the hull?

Aristotle thought the Earth was stationary and that the Sun, the Moon, the planets, and the stars moved in circular orbits about the Earth. He believed this because he felt, for mystical reasons, that the Earth was the centre of the Universe, and that circular motion was the most perfect. This idea was elaborated by Ptolemy in the Second Century CE into a complete cosmological model.

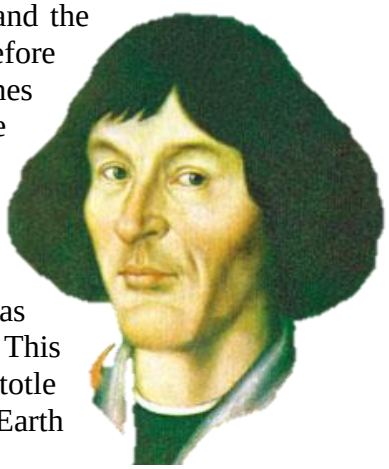
The Earth stood at the centre, surrounded by eight spheres that carried the Moon, the Sun, the stars, and the five planets known at the time, Mercury, Venus, Mars, Jupiter, and Saturn. The planets themselves moved on smaller circles attached to their respective spheres in order to account for their rather complicated observed paths in the sky. The outermost sphere carried the so-called fixed stars, which always stay in the same positions relative to each other but which rotate together across the sky. What lay beyond the last sphere was never made very clear, but it certainly was not part of mankind's observable Universe.



THE UNIVERSE ACCORDING TO PTOLEMY

Ptolemy's model provided a reasonably accurate system for predicting the positions of heavenly bodies in thesky. But in order to predict these positions correctly, Ptolemy had to make an assumption that the Moon followed a path that sometimes brought it twice as close to the Earth as at other times. And that meant that the Moon ought sometimes to appear twice as big as at other times! Ptolemy recognised this flaw, but nevertheless this model was generally, although not universally, accepted. It was adopted by the Christian Church as the picture of the Universe that was in accordance with Scripture, for it had the great advantage that it left lots of room outside the sphere of fixed stars for Heaven and Hell.

A simpler model, however, was proposed in 1514 by a Polish priest, Nicholas Copernicus. (At first, perhaps for fear of being branded a heretic by his church, Copernicus circulated his model anonymously.) His idea was that the Sun was stationary at the centre and that the Earth and the planets moved in circular orbits around the Sun. Nearly a century passed before this idea was taken seriously. Then two astronomers — the German, Johannes Kepler, and the Italian, Galileo Galilei — started publicly to support the Copernican theory, despite the fact that the orbits it predicted did not quite match the ones observed.



Nicholas Copernicus
1473-1543

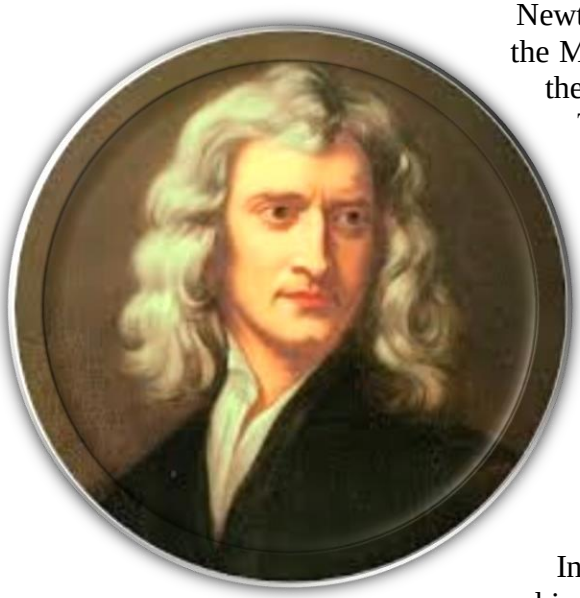
The death blow to the Aristotelian/Ptolemaic theory came in 1609. In that year, Galileo started observing the night sky with a telescope, which had just been invented. When he looked at the planet Jupiter, Galileo found that it was accompanied by several small satellites or moons that orbited around it. This implied that everything did not have to orbit directly around the Earth, as Aristotle and Ptolemy had thought. (It was, of course, still possible to believe that the Earth was stationary at the centre of the Universe and that the moons of Jupiter moved on extremely complicated paths around the Earth, giving the appearance that they orbited Jupiter. However, Copernicus's theory was much simpler.)

At the same time, Johannes Kepler had modified Copernicus's theory, suggesting that the planets moved not in circles but in ellipses (an ellipse is an elongated circle). The predictions now finally matched the observations.

As far as Kepler was concerned, elliptical orbits were merely an *ad hoc* hypothesis, and a rather repugnant one at that, because ellipses were clearly less perfect than circles. Having discovered almost by accident that elliptical orbits fit the observations well, he could not reconcile them with his idea that the planets were made to orbit the Sun by magnetic forces.

An explanation was provided only much later, in 1687, when Sir Isaac Newton published his *Philosophiae Naturalis Principia Mathematica,* probably the most important single work ever published in the physical sciences. In it, Newton not only put forward a theory of how bodies move in space and time, but he also developed the complicated mathematics needed to analyse those motions. In addition, Newton postulated a Law of Universal Gravitation according to which each body in the Universe was attracted toward every other body by a force that was stronger the more massive the bodies and the closer they were to each other. It was this same force that caused objects to fall to the ground.

The story that Newton was inspired by an apple hitting his head is almost certainly apocryphal. All Newton himself ever said was that the idea of gravity came to him as he sat "in a contemplative mood" and "was occasioned by the fall of an apple.")



Isaac Newton
1643-1727

Newton went on to show that, according to his law, gravity causes the Moon to move in an elliptical orbit around the Earth and causes the Earth and the planets to follow elliptical paths around the Sun. The Copernican model got rid of Ptolemy's celestial spheres, and with them, the idea that the Universe had a natural boundary. Since "fixed stars" did not appear to change their positions apart from a rotation across the sky caused by the Earth spinning on its axis, it became natural to suppose that the fixed stars were objects like our Sun but very much farther away. Newton realised that, according to his Theory of Gravity, the stars should attract each other, so it seemed they could not remain essentially motionless.

Would they not all fall together at some point?

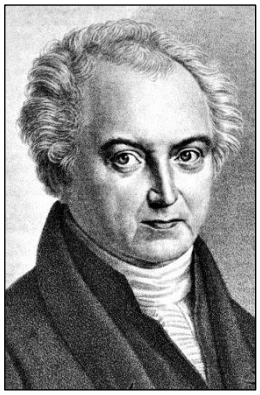
In a letter in 1691 to Richard Bentley, another leading thinker of his day, Newton argued that this would indeed happen if there were only a finite number of stars distributed over a finite region of space. But he reasoned that if, on the other hand, there were an infinite number of stars, distributed more or less uniformly over infinite space, this would not happen, because there would not be any central point for them to fall to. This argument is an instance of the pitfalls that you can encounter in talking about infinity. In an infinite Universe, every point can be regarded as the centre, because every point has an infinite number of stars on each side of it.

The correct approach, it was realised only much later, is to consider the finite situation, in which the stars all fall in on each other, and then to ask how things change if one adds more stars roughly uniformly distributed outside this region. According to Newton's law, the extra stars would make no difference at all to the original ones on average, so the stars would fall in just as fast. We can add as many stars as we like, but theywill still always collapse in on themselves. We now know it is impossible to have an infinite static model of the Universe in which gravity is always attractive.

It is an interesting reflection on the general climate of thought before the Twentieth Century that no one had suggested that the Universe was expanding or contracting. It was generally accepted that either the Universe had existed forever in an unchanging state, or that it had been created at a finite time in the past more or less bas we observe it today. In part this may have been due to people's tendency to believe in eternal truths, as well as the comfort they found in the thought that even though they may grow old and die, the Universe is eternal and unchanging.

Even those who realised that Newton's Theory of Gravity showed that the Universe could not be static did no tthink to suggest that it might be expanding. Instead, they attempted to modify the theory by making the gravitational force repulsive at very large distances. This did not significantly affect their predictions of the motions of the planets, but it allowed an infinite distribution of stars to remain in equilibrium — with the attractive forces between nearby stars balanced by the repulsive forces from those that were farther away.

However, we now believe such an equilibrium would be unstable: if the stars in some region got only slightly nearer each other, the attractive forces between them would become stronger and dominate over the repulsive forces sothat the stars would continue to fall toward each other. On the other hand, if the stars got a bit farther away from each other, the repulsive forces would dominate and drive them further apart.



Heinrich Olbers
1758-1840

Another objection to an infinite static Universe is normally ascribed to the German philosopher Heinrich Olbers, who wrote about this theory in 1823. In fact, various contemporaries of Newton had raised the problem, and the Olbers article was not even the first to contain plausible arguments against it. It was, however, the first to be widely noted. The difficulty is that in an infinite static Universe nearly every line of sight would end on the surface of a star. Thus one would expect that the whole sky would be as bright as the Sun, even at night. Olbers' counter-argument was that the light from distant stars would be dimmed by absorption by intervening matter. However, if that happened the intervening matter would eventually heat up until it glowed as brightly as the stars. The only way of avoiding the conclusion that the whole of the night sky should be as bright as the surface of the Sun would be to assume that the stars had not been shining forever but had turned on at some finite time in the past. In that case the absorbing matter might not have heated up yet or the light from distant stars might not yet have reached us. And that brings us to the question of what could have caused the stars tohave turned on in the first place.

The beginning of the Universe had, of course, been discussed long before this. According to a number of early cosmologies and the Jewish/Christian/Muslim tradition, the Universe started at a finite, and not very distant, time in the past. One argument for such a beginning was the feeling that it was necessary to have "First Cause" to explain the existence of the Universe. (Within the Universe, you always explained one event as being caused by some earlier event, but the existence of the Universe itself could be explained in this way only if it had some beginning.) Another argument was put forward by St. Augustine in his book *The City of God.* He pointed out
that civilisation is progressing and we remember who performed this deed or developed that technique. Thus a man, and so also perhaps the Universe, could not have been around all that long.

St. Augustine accepted a date of about 5000 BCE for the Creation of the Universe according to the book of *Genesis*. (It is interesting that this is not so far from the end of the last Ice Age, about 10,000 BCE, which is when archaeologists tell us that civilisation really began.)

Aristotle, and most of the other Greek philosophers, on the other hand, did not like the idea of a creation because it smacked too much of divine intervention. They believed, therefore, that the human race and theworld around it had existed, and would exist, forever. The ancients had already considered the argument about progress described above and answered it by saying that there had been periodic floods or other disasters that repeatedly set the human race right back to the beginning of civilisation.

The questions of whether the Universe had a beginning in time and whether it is limited in space were later extensively examined by the philosopher Immanuel Kant in his monumental (and very obscure) work *Critique of Pure Reason,* published in 1781. He called these questions antinomies (that is, contradictions) of pure reason because he felt that there were equally compelling arguments for believing the thesis, that the Universe had a beginning, and the antithesis, that it had existed forever. His argument for the thesis was that if the Universe did not have a beginning; there would be an infinite period of time before any event, which he considered absurd.

The argument for the antithesis was that if the Universe had a beginning, there would be an infinite period of time before it, so why should the Universe begin at any one particular time?

In fact, his cases for both the thesis and the antithesis are really the same argument. They are both based on his unspoken assumption that time continues back forever, whether or not the Universe had existed forever. As we shall see, the concept of time has no meaning before the beginning of the Universe. This was first pointed out by St. Augustine. When asked:

"What did God do before he created the Universe?"

Augustine didn't reply: "He was preparing Hell for people who asked such questions."

Instead, he said that time was a property of the Universe that God created, and that time did not exist before the beginning of the Universe.

When most people believed in an essentially static and unchanging Universe, the question of whether or not it had a beginning was really one of metaphysics or theology. One could account for what was observed equally well on the theory that the Universe had existed forever or on the theory that it was set in motion at some finite time in such a manner as to look as though it had existed forever.

Edwin Hubble
1889-1953

But in 1929, Edwin Hubble made the landmark observation that wherever you look, distant galaxies are moving rapidly away from us. In other words, the Universe is expanding. This means that at earlier times objects would have been closer together. In fact, it seemed that there was a time, about ten or twenty thousand million years ago, when they were all at exactly the same place and when, therefore, the density of the Universe was infinite. This discovery finally brought the question of the beginning of the Universe into the realm of science.

Hubble's observations suggested that there was a time, called the Big Bang, when the Universe was infinitesimally small and infinitely dense. Under such conditions all the laws of science, and therefore all ability to predict the future, would break down.

If there were events earlier than this time, then they could not affect what happens at the present time. Their existence can be ignored because it would have no observational consequences. One may say that time had a beginning at the Big Bang, in the sense that earlier times simplywould not be defined.

It should be emphasised that this beginning in time is very different from those that hadbeen considered previously. In an unchanging Universe a beginning in time is something that has to be imposed by some being outside the Universe; there is no physical necessity for a beginning.

One can imagine that God created the Universe at literally any time in the past. On the other hand, if the Universe is expanding, there may be physical reasons why there had to be a beginning.

One could still imagine that God created the Universe at the instant of the Big Bang, or even afterwards in just such a way as to make it look as though there had been a Big Bang, but it would be meaningless to suppose that it was created before the Big Bang. An expanding Universe does not preclude a creator, but it does place limits on when he might have carried out his job!

In order to talk about the nature of the Universe and to discuss questions such as whether it has a beginning oran end, you have to be clear about what a scientific theory is. I shall take the simple-minded view that a theory is just a model of the Universe, or a restricted part of it, and a set of rules that relate quantities in the model to observations that we make. It exists only in our minds and does not have any other reality.

A theory is a good theory if it satisfies two requirements. It must accurately describe a large class of observations on the basis of a model that contains only a few arbitrary elements, and it must make definite predictions about the results of future observations. For example, Aristotle believed Empedocles's theory that everything was made out of four elements, earth, air, fire, and water. This was simple enough, but did not make any definite predictions.

On the other hand, Newton's Theory of Gravity was based on an even simpler model, in which bodies attracted each other with a force that was proportional to a quantity called their mass and inversely proportional to the square of the distance between them. Yet it predicts the motions of the Sun, the Moon, and the planets to a high degree of accuracy.

Any physical theory is always provisional, in the sense that it is only a hypothesis: you can never prove it. No matter how many times the results of experiments agree with some theory, you can never be sure that the next time the result will not contradict the theory. On the other hand, you can disprove a theory by finding even a single observation that disagrees with the predictions of the theory.

As philosopher of science Karl Popper has emphasised, a good theory is characterised by the fact that it makes a number of predictions that could in principle be disproved or falsified by observation. Each time new experiments are observed to agree with thepredictions the theory survives, and our confidence in it is increased; but if ever a new observation is found todisagree, we have to abandon or modify the theory. At least that is what is supposed to happen, but you can always question the competence of the person who carried out the observation.

In practice, what often happens is that a new theory is devised that is really an extension of the previous theory.For example, very accurate observations of the planet Mercury revealed a small difference between its motion and the predictions of Newton's Theory of Gravity. Einstein's General Theory of Relativity predicted a slightly different motion from Newton's Theory. The fact that Einstein's predictions matched what was seen, while Newton's did not, was one of the crucial confirmations of the new theory.

However, we still use Newton's Theory for all practical purposes because the difference between its predictions and those of General Relativity is very small in the situations that we normally deal with. (Newton's Theory also has the great advantage that it is much simpler to work with than Einstein's!)

The eventual goal of science is to provide a single theory that describes the whole Universe. However, the approach most scientists actually follow is to separate the problem into two parts.

First, there are the laws that tell us how the Universe changes with time. (If we know what the Universe is like at any one time, these physical laws tell us how it will look at any later time.)

Second, there is the question of the initial state of the Universe. Some people feel that science should be concerned with only the first part; they regard the question of the initial situation as a matter for metaphysics or religion. They would say that God, being omnipotent, could have started the Universe off any way he wanted. That may be so, but in that case he also could have made it develop in a completely arbitrary way. Yet it appears that he chose to make it evolve in a very regular way according to certain laws. It therefore seems equally reasonable to suppose that there are also laws governing the initial state.

It turns out to be very difficult to devise a theory to describe the Universe all in one go. Instead, we break the problem up into bits and invent a number of partial theories. Each of these partial theories describes andpredicts a certain limited class of observations, neglecting the effects of other quantities, or representing them by simple sets of numbers. It may be that this approach is completely wrong. If everything in the Universe depends on everything else in a fundamental way, it might be impossible to get close to a full solution by investigating parts of the problem in isolation. Nevertheless, it is certainly the way that we have made progress in the past.

The classic example again is the Newtonian Theory of Gravity, which tells us that the gravitational force between two bodies depends only on one number associated with each body, its mass, but is otherwise independent of what the bodies are made of. Thus one does not need to have a theory of the structure and constitution of the Sun and the planets in order to calculate their orbits.

Today scientists describe the Universe in terms of two basic partial theories — the General Theory of Relativity and Quantum Mechanics. They are the great intellectual achievements of the first half of the Twentieth Century.

The General Theory of Relativity describes the force of gravity and the large-scale structure of the Universe, that is, the structure on scales from only a few kilometres to as large as a million, million, million, million (1 with twenty-four zeros after it) kilometres, the size of the observable Universe.

Quantum Mechanics, on the other hand, deals with phenomena on extremely small scales, such as a millionth of a millionth of a centimetre. Unfortunately, however, these two theories are known to be inconsistent with each other — they cannot both be correct. One of the major endeavours in physics today, and the major theme of this book, is the search for a new theory that will incorporate them both — a Quantum Theory of Gravity. We do not yet have such a theory, and we may still be a long way from having one, but we do already know many of the properties that it must have; we already know a fair amount about the predications a Quantum Theory of Gravity must make.

Now, if you believe that the Universe is not arbitrary, but is governed by definite laws, you ultimately have to combine the partial theories into a complete Unified Theory that will describe everything in the Universe. But there is a fundamental paradox in the search for such a complete Unified Theory. The ideas about scientific theories outlined above assume we are rational beings who are free to observe the Universe as we want and to draw logical deductions from what we see. In such a scheme it is reasonable to suppose that we might progress ever closer toward the laws that govern our Universe.

Yet if there really is a complete Unified Theory, it would also presumably determine our actions. And so the theory itself would determine the outcome of our search for it!

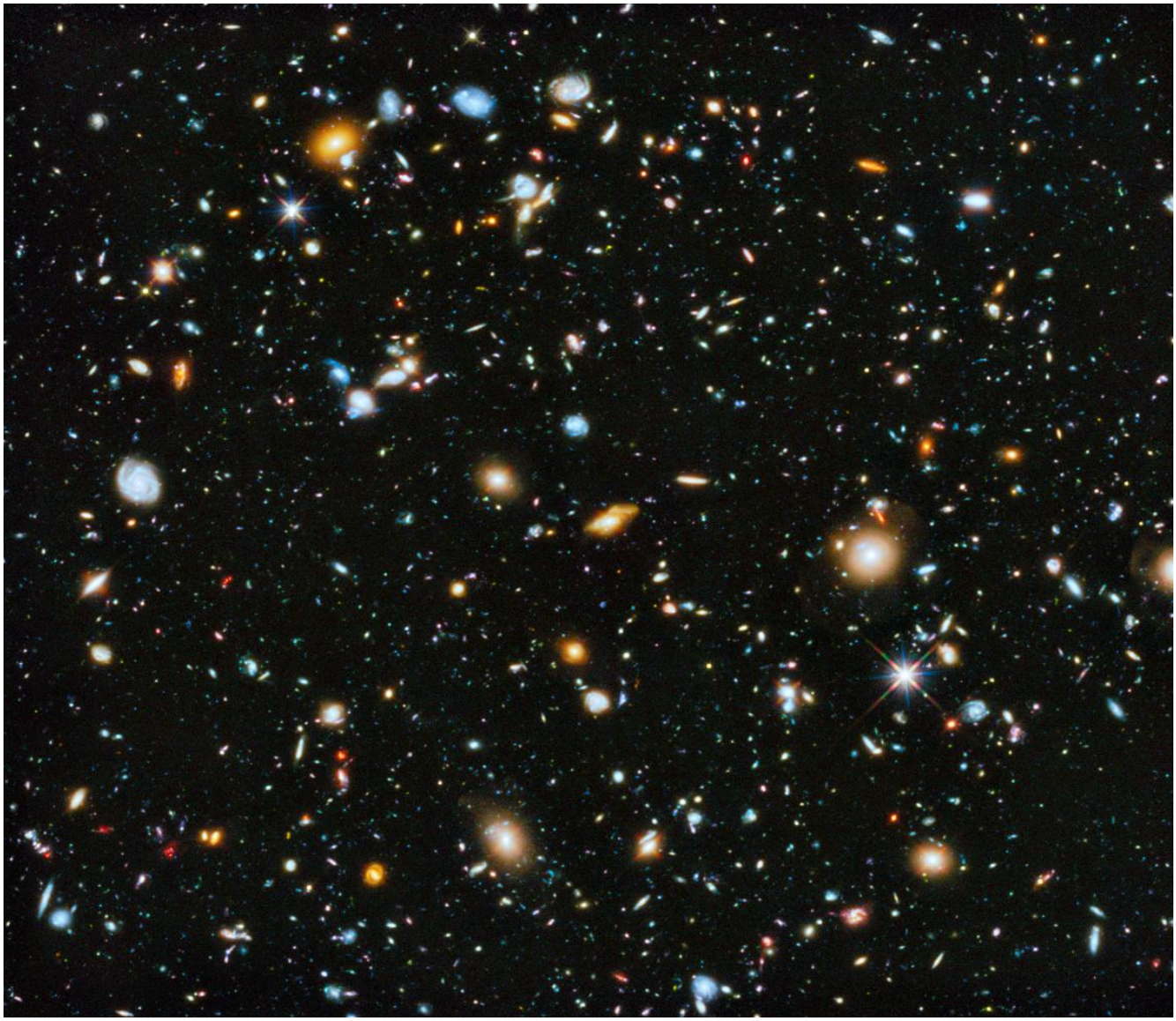
And why should it determine that wecome to the right conclusions from the evidence? Might it not equally well determine that we draw the wrong conclusion? Or no conclusion at all?

The only answer that I can give to this problem is based on Darwin's principle of natural selection. The idea is that in any population of self-reproducing organisms, there will be variations in the genetic material and upbringing that different individuals have. These differences will mean that some individuals are better able than others to draw the right conclusions about the world around them and to act accordingly.

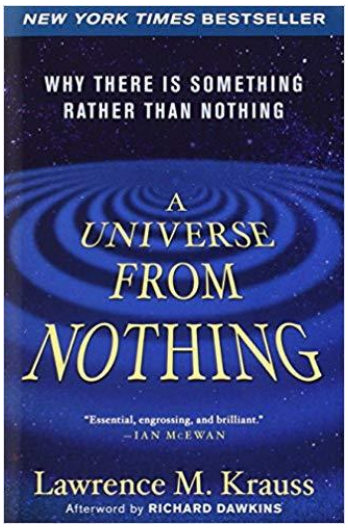
These individuals will be more likely to survive and reproduce and so their pattern of behaviour and thought will come to dominate. It has certainly been true in the past that what we call intelligence and scientific discovery have conveyed a survival advantage. It is not so clear that this is still the case: our scientific discoveries may well destroy us all, and even if they don't, a complete unified theory may not make much difference to our chances of survival. However, provided the Universe has evolved in a regular way, we might expect that the reasoning abilities that natural selection has given us would be valid also in our search for a complete Unified Theory, and so would not lead us to the wrong conclusions.

Because the partial theories that we already have are sufficient to make accurate predictions in all but the most extreme situations, the search for the ultimate theory of the Universe seems difficult to justify on practical grounds. (It is worth noting, though, that similar arguments could have been used against both Relativity and Quantum Mechanics, and these theories have given us both nuclear energy and the micro-electronics revolution!) The discovery of a complete Unified Theory, therefore, may not aid the survival of our species. It may not even affect our lifestyle. But ever since the dawn of civilisation, people have not been content to see events as unconnected and inexplicable. They have craved an understanding of the underlying order in the world. Today we still yearn to know why we are here and where we came from.

Humanity's deepest desire for knowledge is justification enough for our continuing quest. And our goal is nothing less than a complete description of the Universe we live in.



This Ultra-Deep image from the Hubble Space Telescope contains approximately 100.000 galaxies includes some of the most distant to be photographed by an optical telescope. The light from the most distant galaxies has taken hundreds of millions of years to reach us.



A COSMIC MYSTERY STORY: BEGINNINGS

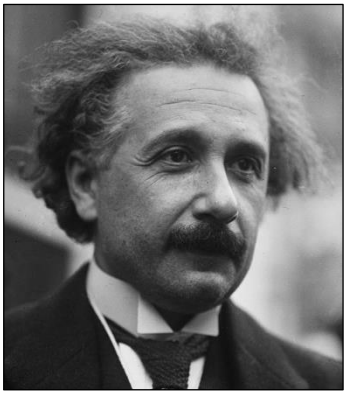
This is a slightly reduced version of Chapter 1 of

A Universe from Nothing
by
Lawrence M. Krauss

Early in 1916, Albert Einstein had just completed his greatest life's work, a decade-long, intense intellectual struggle to derive a new theory of gravity, which he called the General Theory of Relativity. This was not just a new Theory of Gravity, however; it was a new theory of space and time as well. And it was the first scientific theory that could explain not merely how objects move through the Universe, but also how the Universe itself might evolve.

There was just one hitch, however. When Einstein began to apply his theory to describing the Universe as a whole, it became clear that the theory didn't describe the Universe in which we apparently lived.

Now, almost one hundred years later, it is difficult to fully appreciate how much our picture of the Universe has changed in the span of a single human lifetime. As far as the scientific community in 1917 was concerned, the Universe was static and eternal, and consisted of a single galaxy, our Milky Way, surrounded by a vast, infinite, dark, and empty space. This is, after all, what you would guess by looking up at the night sky with your eyes, or with a small telescope, and at the time there was little reason to suspect otherwise.



Albert Einstein
1879-1955

In Einstein's theory, as in Newton's Theory of Gravity before it, gravity is a purely attractive force between all objects. This means that it is impossible to have a set of masses located in space at rest forever. Their mutual gravitational attraction will ultimately cause them to collapse inward, in manifest disagreement with an apparently static Universe.

The fact that Einstein's General Relativity didn't appear consistent with the then picture of the Universe was a bigger blow to him than you might imagine, for reasons that allow me to dispense with a myth about Einstein and General Relativity that has always bothered me. It is commonly assumed that Einstein worked in isolation in a closed room for years, using pure thought and reason, and came up with his beautiful theory, independent of reality. However, nothing could be further from the truth.

Einstein was always guided deeply by experiments and observations. While he performed many "thought experiments" in his mind and did toil for over a decade, he learned new mathematics and followed many false theoretical leads in the process before he ultimately produced a theory that was indeed mathematically beautiful. The single most important moment in establishing his love affair with General Relativity, however, had to do with observation.

During the final hectic weeks that he was completing his theory, competing with the German mathematician David Hilbert, he used his equations to calculate the prediction for what otherwise might seem an obscure astrophysical result: a slight precession in the 'perihelion' (the point of closest approach) of the planet Mercury's orbit around the Sun. Astronomers had long noted that the orbit of Mercury departed slightly from that predicted by Newton. Instead of being a perfectellipse that returned to itself, the orbit of Mercury precessed (which means that the planet does not return precisely to the same point after one orbit, but the orientation of the ellipse shifts slightly each orbit, ultimately tracing out a kind of spiral-like pattern) by an incredibly small amount: 43 arc seconds per century.

When Einstein performed his calculation of the orbit using his theory of general relativity, the number came out just right. As described by an Einstein biographer, Abraham Pais: "This discovery was, I believe, by far the strongest emotional experience in Einstein's scientific life, perhaps in all his life." He claimed to have heart palpitations, as if "something had snapped" inside. A month later, when he described his theory to a friend as one of "incomparable beauty," his pleasure over the mathematical form was indeed manifest, but no palpitations were reported.

The apparent disagreement between General Relativity and observation regarding the possibility of a static Universe did not last long, however. (Even though it did cause Einstein to introduce a modification to his theory that he later called his biggest blunder.) Everyone now knows that the Universe is not static but is expanding and that the expansion began in an incredibly hot, dense Big Bang approximately 13.72 billion years ago. Equally important, we know that our galaxy is merely one of perhaps 400 billion galaxies in the observable Universe. We are like the early terrestrial mapmakers, just beginning to fully map the Universe on its largest scales. Little wonder that recent decades have witnessed revolutionary changes in our picture of the Universe.

The discovery that the Universe is not static, but rather expanding, has profound philosophical and religious significance, because it suggested that our Universe had a beginning. A beginning implies creation, and creation stirs emotions. While it took several decades following the discovery in 1929 of our expanding Universe for the notion of a Big Bang to achieve independent empirical confirmation, Pope Pius XII heralded it in 1951 as evidence for *Genesis*. As he put it:

"It would seem that present-day science, with one sweep back across the centuries, has succeeded in bearing witness to the august instant of the primordial Fiat Lux [Latin: 'Let there be Light']**, when along with matter, there burst forth from nothing a sea of light and radiation, and the elements split and churned and formed into millions of galaxies. Thus, with that concreteness which is characteristic of physical proofs, has confirmed the contingency of the Universe and also the well-founded deduction as to the epoch when the world came forth from the hands of the Creator. Hence, creation took place. We say: 'Therefore, there is a Creator. Therefore, God exists!'"**

Georges Lemaître
1894-1966

The full story is actually a little more interesting. In fact, the first person to propose a Big Bang was a Belgian priest and physicist named Georges Lemaître. Lemaître was a remarkable combination of proficiencies. He started his studies as an engineer, was a decorated artilleryman in World War I, and then switched to mathematics while studying for the priesthood in the early 1920s. He then moved on to cosmology, studying first with the famous British astrophysicist Sir Arthur Stanley Eddington before moving on to Harvard and eventually receiving a second doctorate, in physics from the Massachusetts Institute of Technology (MIT).

In 1927, before receiving his second doctorate, Lemaître had actually solved Einstein's equations for general relativity and demonstrated that the theory predicts a non-static Universe and in fact suggests that the Universe we live in is expanding. The notion seemed so outrageous that Einstein himself colorfully objected with the statement "Your math is correct, but your physics is abominable."

Nevertheless, Lemaître powered onward, and in 1930 he further proposed that our expanding Universe actually began as an infinitesimal point, which he called the "Primeval Atom" and that this beginning represented, in an allusion to *Genesis* perhaps, a "Day with No Yesterday."

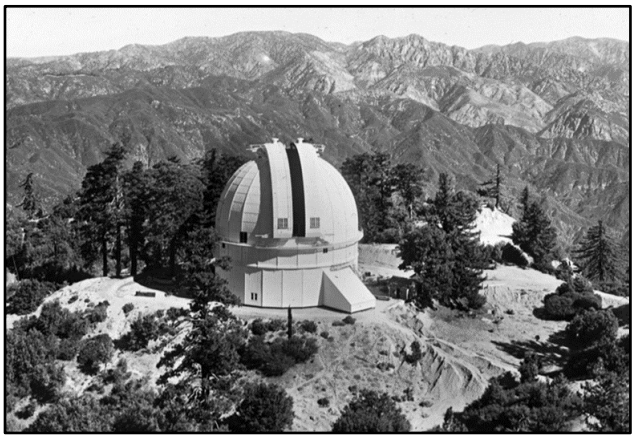
Thus, the Big Bang, which Pope Pius so heralded, had first been proposed by a priest. One might have thought that Lemaître would have been thrilled with this papal validation, but he had already dispensed in his own mind with the notion that this scientific theory had theological consequences and had ultimately removed a paragraph in the draft of his 1931 paper on the Big Bang remarking on this issue.

Lemaître in fact later voiced his objection to the pope's 1951 claimed proof of *Genesis* via the Big Bang (not least because he realized that if his theory was later proved incorrect, then the Roman Catholic claims for *Genesis* might be contested). By this time, he had been elected to the Vatican's Pontifical Academy, later becoming its president. As he put it, "As far as I can see, such a theory remains entirely outside of any metaphysical or religious question." The Pope never again brought up the topic in public.

There is a valuable lesson here. As Lemaître recognized, whether or not the Big Bang really happened is a scientific question, not a theological one. Moreover, even if the Big Bang had happened (which all evidence now overwhelmingly supports), one could choose to interpret it in different ways depending upon one's religious or metaphysical predilections. You can choose to view the Big Bang as suggestive of a creator if you feel the need or instead argue that the mathematics of General Relativity explain the evolution of the Universe right back to its beginning without the intervention of any deity. But such a metaphysical speculation is independent of the physical validity of the Big Bang itself and is irrelevant to our understanding of it. Of course, as we go beyond the mere existence of an expanding Universe to understand the physical principles that may address its origin, science can shed further light on this speculation and, as I shall argue, it does.

In any case, neither Lemaître nor Pope Pius convinced the scientific world that the Universe was expanding. Rather, as in all good science, the evidence came from careful observations, in this case done by Edwin Hubble, who continues to give me great faith in humanity, because he started out as a lawyer and then became an astronomer.

Hubble had earlier made a significant breakthrough in 1925 with the Mount Wilson 100-inch [2.5 metre] Hooker telescope, then the world's largest. (For comparison, we are now building telescopes more than ten times bigger than this in diameter and one hundred times bigger in area!)



Mount Wilson Observatory with 2.5 metre Hooker Telescope completed 1917

Up until that time, with the telescopes then available, astronomers were able to discern fuzzy images of objects that were not simple stars in our galaxy. They called these nebulae, which is basically Latin for 'cloud'. They also debated whether these objects were in our galaxy or outside of it.

Since the prevailing view of the Universe at the time was that our galaxy was all that there was, most astronomers fell in the "in our galaxy" camp, led by the famous astronomer Harlow Shapley at Harvard. Shapley had dropped out of school in fifth grade and studied on his own, eventually going to Princeton. He decided to study astronomy by picking the first subject he found in the syllabus to study.

In a seminal work he demonstrated that the Milky Way was much larger than previously thought and that the Sun was not at its center but simply in a remote, uninteresting corner. He was a formidable force in astronomy and therefore his views on the nature of nebulae held considerable sway.

On New Year's Day 1925, Hubble published the results of his two-year study of so-called spiral nebulae, where he was able to identify a certain type of variable star, called a Cepheid variable star, in these nebulae, including the nebula now known as Andromeda. First observed in 1784, Cepheid variable stars are stars whose brightness varies over some regular period. In 1908, an unheralded and at the time unappreciated would-be astronomer, Henrietta Swan Leavitt, was employed as a 'computer' at the Harvard College Observatory. ('Computers' were women brought in to catalogue the brightness of stars recorded on the observatory's photographic plates; women were not allowed to use the observatory telescopes at the time.)

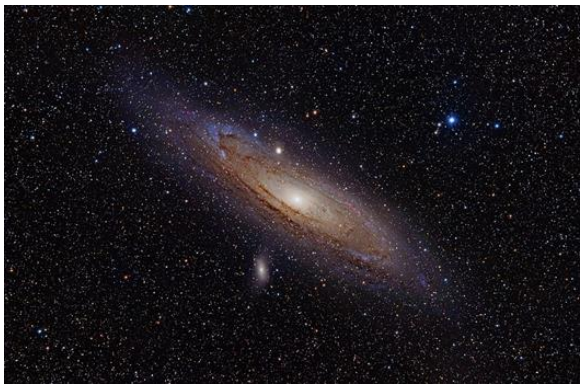
Daughter of a Congregational minister and a descendant of the Pilgrims, Leavitt made an astounding discovery, which she further illuminated in 1912: she noticed that there was a regular relationship between the brightness of Cepheid stars and the period of their variation. Therefore, if one could determine the distance to a single Cepheid of a known period (subsequently determined in 1913), then measuring the brightness of other Cepheids of the same period would allow one to determine the distance to these other stars!

Henrietta Swan Leavitt (1868-1921)

Since the observed brightness of stars goes down inversely with the square of the distance to the star (the light spreads out uniformly over a sphere whose area increases as the square of the distance, and thus since the light is spread out over a bigger sphere, the intensity of the light observed at any point decreases inversely with the area of the sphere), determining the distance to faraway stars has always been the major challenge in astronomy. Leavitt's discovery revolutionized the field.

Paperwork had actually begun in the Royal Swedish Academy to nominate Leavitt for the Nobel Prize for Physics in 1924 when it was learned that she had died of cancer three years earlier. Hubble would become a household name, while Leavitt, alas, is known only to aficionados of the field.

Hubble was able to use his measurement of Cepheids and Leavitt's period-luminosity relation to prove definitively that the Cepheids in Andromeda and several other nebulae were much too distant to be inside the Milky Way. Andromeda was discovered to be another island universe, another spiral galaxy almost identical to our own, and one of the more than 100 billion other galaxies that, we now know, exist in our observable Universe. Hubble's result was sufficiently unambiguous that the astronomical community — including Shapley, who, incidentally, by this time had become director of the Harvard College Observatory, where Leavitt had done her groundbreaking work — quickly accepted the fact that the Milky Way is not all there is around us. Suddenly the size of the known Universe had expanded in a single leap by a greater amount than it had in centuries! Its character had changed, too, as had almost everything else.



Andromeda Galaxy

After this dramatic discovery, Hubble could have rested on his laurels, but he was after bigger fish or, in this case, bigger galaxies. By measuring ever fainter Cepheids in ever more distant galaxies, he was able to map the Universe out to ever-larger scales. When he did, however, he discovered something else that was even more remarkable: the Universe is expanding!

Vesto Slipher (1875-1969)

Hubble achieved his result by comparing the distances for these galaxies he measured with a different set of measurements from another American astronomer, Vesto Slipher, who had measured the spectra of light coming from these galaxies. Understanding the existence and nature of such spectra requires me to take you back to the very beginning of modern astronomy.

One of the most important discoveries in astronomy was that star stuff and Earth stuff are largely the same. It all began, as did many things in modern science, with Isaac Newton. In 1665, Newton, then a young scientist, allowed a thin beam of sunlight, obtained by darkening his room except for a small hole he made in his window shutter, through a prism and saw the sunlight disperse into the familiar colors of the rainbow. He reasoned that white light from the sun contained all of these colors, and he was correct.

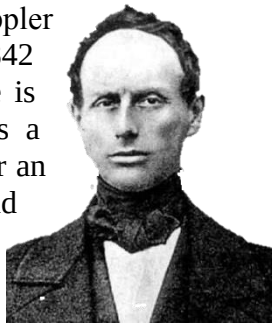
A hundred fifty years later, another scientist examined the dispersed light more carefully, discovered dark bands amidst the colors, and reasoned that these were due to the existence of materials in the outer atmosphere of the sun that were absorbing light of certain specific colors or wavelengths.

These "absorption lines", as they became known, could be identified with wavelengths of light that were measured to be absorbed by known materials on Earth, including hydrogen, oxygen, iron, sodium, and calcium.

In 1868, another scientist observed two new absorption lines in the yellow part of the solar spectrum that didn't correspond to any known element on Earth. He decided this must be due to some new element, which he called helium. A generation later, helium was discovered on Earth.

Looking at the spectrum of radiation coming from other stars is an important scientific tool for understanding their composition, temperature, and evolution. Starting in 1912, Slipher observed the spectra of light coming from various spiral nebulae and found that the spectra were similar to those of nearby stars — except that all of the absorption lines were shifted by the same amount in wavelength.

This phenomenon was by then understood as being due to the familiar "Doppler effect," named after the Austrian physicist Christian Doppler, who explained in 1842 that waves coming at you from a moving source will be stretched if the source is moving away from you and compressed if it is moving toward you. This is a manifestation of a phenomenon we are all familiar with, indeed, a train whistle or an ambulance siren sounds higher if the train or ambulance is moving toward you and lower if it is moving away from you.



Christian Doppler (1803-1853)

It turns out that the same phenomenon occurs for light waves as sound waves, although for somewhat different reasons. Light waves from a source moving away from you, either due to its local motion in space or due to the intervening expansion of space, will be stretched, and therefore appear redder than they would otherwise be, since red is the long-wavelength end of the visible spectrum, while waves from a source moving toward you will be compressed and appear bluer.

Slipher observed in 1912 that the absorption lines from the light coming from all the spiral nebulae were almost all shifted systematically toward longer wavelengths (although some, like Andromeda, were shifted toward shorter wavelengths). He correctly inferred that most of these objects therefore were moving away from us with considerable velocities.

Hubble was able to compare his observations of the distance of these spiral galaxies (as they were by now known to be) with Slipher's measurements of the velocities by which they were moving away. In 1929, with the help of a Mount Wilson staff member, Milton Humason (whose technical talent was such that he had secured a job at Mount Wilson without even having a high school diploma), he announced the discovery of a remarkable empirical relationship, now called Hubble's law:

There is a linear relationship between recessional velocity and galaxy distance. Namely, galaxies that are ever more distant are moving away from us with faster velocities!

When first presented with this remarkable fact — that almost all galaxies are moving away from us, and those that are twice as far away are moving twice as fast, those that are three times away three times as fast, etc. — it seems obvious what this implies: We are the center of the Universe!

This is not the case. Rather, it was consistent with precisely the relationship that Lemaître had predicted. Our Universe is indeed expanding. To see what Hubble's law implies, you need to remove yourself from the myopic vantage point of our galaxy and look at our Universe from the outside. From any galaxy's vantage point every other galaxy is moving away, and those that are twice as far have moved twice the distance in the same time, those that are three times as far away have moved three times the distance, etc. As long as there is no edge, those on the galaxy feel as if they are at the center of the expansion.

Depending upon your perspective, then, either every place is the center of the Universe, or no place is. It doesn't matter; Hubble's law is consistent with a Universe that is expanding.

If everything is moving apart today, then at earlier times they were closer together. Now, if gravity is an attractive force, then it should be slowing the expansion of the Universe. This means the galaxy we see moving away from us at 500 kilometers/second today would have been moving faster earlier.

If for the moment, though, we just assume that the galaxy had always been carried away with that velocity, we can work backward and figure out how long ago it would have been at the same position as our galaxy. Since galaxies twice as far away are moving twice as fast, if we work backward we find out that they were superimposed on our position at exactly the same time. Indeed, the entire observable Universe would have been superimposed at a single point, the Big Bang, at a time that we can estimate in this way.

When a star explodes, it briefly (over the course of about a month or so) shines in visible light with a brightness of 10 billion stars and is known as a supernova, one of the brightest fireworks displays in the universe. Happily for us, stars don't explode that often, about once per hundred years per galaxy. But we are lucky that they do, because if they didn't, we wouldn't be here.

One of the most poetic facts I know about the Universe is that essentially every atom in your body was once inside a star that exploded. Moreover, the atoms in your left hand probably came from a different star than did those in your right. We are all, literally, star children, and our bodies made of stardust.

How do we know this?

Well, we can take our picture of the Big Bang back to a time when the Universe was about 1 second old, and we calculate that all observed matter was compressed in a dense plasma whose temperature should have been about 10 billion degrees Kelvin. At this temperature nuclear reactions can readily take place between protons and neutrons as they bind together and then break apart from further collisions.

Following this process as the Universe cools, we can predict how frequently these primeval nuclear constituents will bind to form the nuclei of atoms heavier than hydrogen (i.e. helium, lithium, and so on). When we do so, we find that essentially no nuclei — beyond lithium, the third lightest nucleus in nature — formed during the primeval fireball that was the Big Bang. We are confident that our calculations are correct because our predictions for the cosmic abundances of the lightest elements agree bang-on with these observations.

The abundances of these lightest elements — hydrogen, deuterium (the nucleus of heavy hydrogen), helium, and lithium — vary by 10 orders of magnitude (roughly 25% of the protons and neutrons, by mass, end up in helium, while 1 in every 10 billion neutrons and protons ends up within a lithium nucleus). Over this incredible range, observations and theoretical predictions agree.

This is one of the most famous, significant, and successful predictions telling us the Big Bang really happened. Only a hot Big Bang can produce the observed abundance of light elements and maintain consistency with the current observed expansion of the Universe.

While lithium is important for some people, far more important to the rest of us are all the heavier nuclei like carbon, nitrogen, oxygen, iron, and so on. These were not made in the Big Bang. The only place they can be made is in the fiery cores of stars. And the only way they could get into your body today is if these stars were kind enough to have exploded, spewing their products into the cosmos so they could one day coalesce in and around a small blue planet located near the star we call the Sun. Over the course of the history of our galaxy, about 200 million stars have exploded. These myriad stars sacrificed themselves, if you wish, so that one day you could be born.

It turns out a certain type of exploding star, called a Type la supernova, has been shown by careful studies performed over the 1990s to have a remarkable property: with high accuracy, those Type la supernovae that are intrinsically brighter also shine longer. This means that these supernovae are very good "standard candles". By this we mean that these supernovae can be used to calibrate distances because their intrinsic brightness can be directly ascertained by a measurement that is independent of their distance. If we observe a supernova in a distant galaxy — and we can because they are very bright — then by observing how long it shines, we can infer its intrinsic brightness. Then, by measuring its apparent brightness with our telescopes, we can accurately infer just how far away the supernova and its host galaxy are. Then, by measuring the 'redshift' of the light from the stars in the galaxy, we can determine its velocity, and thus can compare velocity with distance and infer the expansion rate of the Universe.

Type 1a Supernova Remnant G299

So far so good, but if supernovae explode only once every hundred years or so per galaxy, how likely are we ever to be able to see one?

After all, the last supernova in our own galaxy witnessed on Earth was seen by Johannes Kepler in 1604! Indeed, it is said that supernovae in our galaxy are observed only during the lifetimes of the greatest astronomers, and Kepler certainly fits the bill. Starting out as a humble mathematics teacher in Austria, Kepler became assistant to the astronomer Tycho Brahe (who himself had observed an earlier supernova in our galaxy and was given an entire island by the King of Denmark in return), and using Brahe's data on planetary positions in the sky taken over more than a decade, Kepler derived his famous three laws of planetary motion early in the seventeenth century:

1. Planets move around the Sun in ellipses.

2. A line connecting a planet and the Sun sweeps out equal areas during equal intervals of time.

3. The square of the orbital period of a planet is directly proportional to the cube (3^{rd} power) of the semi-major axis of its orbit (or, in other words, of the "semi-major-axis" of the ellipse, half of the distance across the widest part of the ellipse).

These laws in turn lay the basis for Newton's derivation of the universal law of gravity almost a century later. Besides this remarkable contribution, Kepler successfully defended his mother in a witchcraft trial and wrote what was perhaps the first science fiction story, about a journey to the moon.

Nowadays, one way to see a supernova is simply to assign a different graduate student to each galaxy in the sky. After all, one hundred years is not too different, in a cosmic sense at least, from the average time to do a PhD, and graduate students are cheap and abundant. Happily, however, we don't have to resort to such extreme measures, for a very simple reason: the Universe is big and old and, as a result, rare events happen all the time.

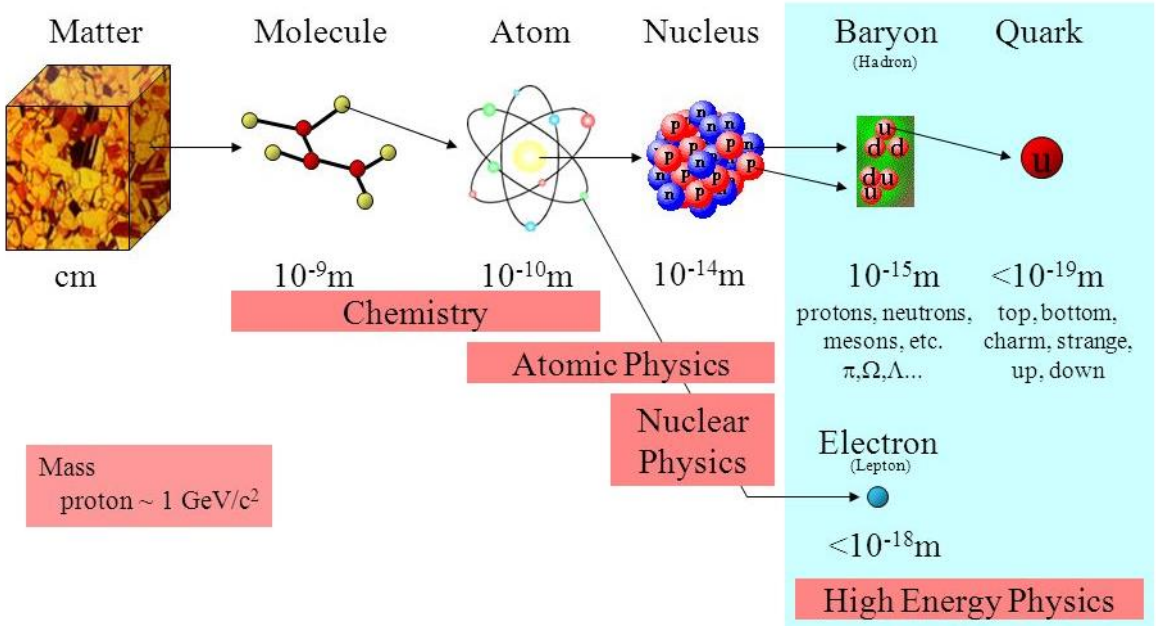
Go out some night into the woods or desert where you can see stars and hold up your hand to the sky, making a tiny circle between your thumb and forefinger about the size of a dime. Hold it up to a dark patch of the sky where there are no visible stars. In that dark patch, with a large enough telescope of the type we now have in service today, you could discern perhaps 100,000 galaxies, each containing billions of stars. Since supernovae explode once per hundred years per, with 100,000 galaxies in view, you should expect to see, on average, about three stars explode on a given night.

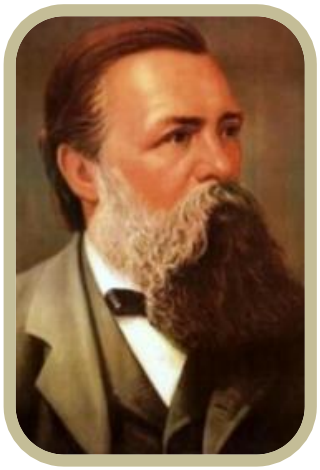
Astronomers do just this. They apply for telescope time, and some nights they might see one star explode, some nights two, and some nights it might be cloudy and they might not see any. In this way several groups have been able to determine Hubble's constant with an uncertainty of less than 10%. As a result, we infer an age of the Universe of close to 13 billion years.

From Brahe to Kepler, from Lemaître to Einstein and Hubble, and from the spectra of stars to the abundance of light elements, four hundred years of modern science have produced a remarkable and consistent picture of the expanding Universe. Everything holds together.

The Big Bang picture is in good shape.

THE STRUCTURE OF MATTER





THE PART PLAYED BY LABOUR IN THE TRANSITION FROM APE TO MAN

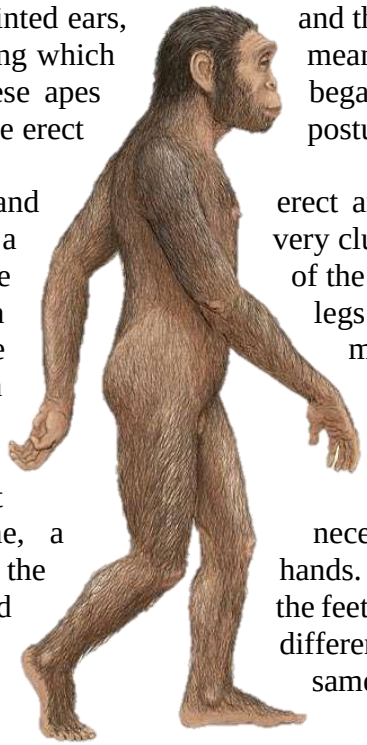
by

Frederick Engels (1876)

Engels was using the latest scientific knowledge of his day, and as science advances, incomplete, less accurate knowledge becomes more complete and more accurate. Therefore, SOME of what Engels writes here is now outdated. BUT THE GENERAL THEORY that he expresses here has been confirmed over and over by scientific research and is accepted by all who study human evolution in a scientific manner.

Labour is the source of all wealth, the political economists assert. And it really is the source — next to nature, which supplies it with the material that it converts into wealth. But it is even infinitely more than this. It is the prime basic condition for all human existence, and this to such an extent that, in a sense, we have to say that labour created man himself.

Many hundreds of thousands of years ago, during an epoch, not yet definitely determinable, of that period of the earth's history known to geologists as the Tertiary[1] period, most likely towards the end of it, a particularly highly-developed race of anthropoid apes lived somewhere in the tropical zone — probably on a great continent that has now sunk to the bottom of the Indian Ocean.[2] Darwin[3] has given us an approximate description of these ancestors of ours. They were completely covered with hair, they had beards and pointed ears, and they lived in bands in the trees.

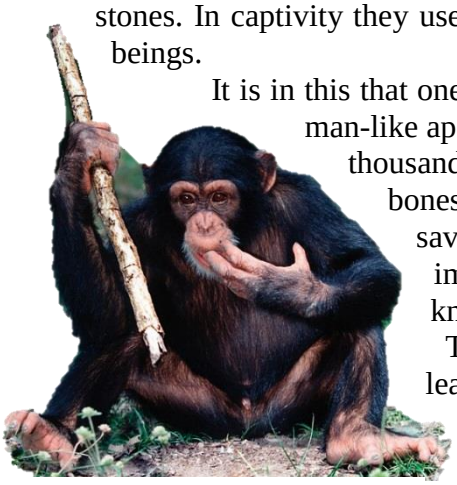


First, owing to their way of living which meant that the hands had different functions than the feet when climbing, these apes began to lose the habit of using their hands to walk and adopted a more and more erect posture. This was **the decisive step in the transition from ape to man.**

All extant anthropoid apes can stand erect and move about on their feet alone, but only in case of urgent need and in a very clumsy way. Their natural gait is in a half-erect posture and includes the use of the hands. The majority rest the knuckles of the fist on the ground and, with legs drawn up, swing the body through their long arms, much as a cripple moves on crutches. In general, all the transition stages from walking on all fours to walking on two legs are still to be observed among the apes today. The latter gait, however, has never become more than a makeshift for any of them.

It stands to reason that if erect gait among our hairy ancestors became first the rule and then, intime, a necessity, other diverse functions must, in the meantime, have devolved upon the hands. Already among the apes there is some difference in the way the hands and the feet are employed. In climbing, as mentioned above, the hands and feet have different uses. The hands are used mainly for gathering and holding food in the same way as the fore paws of the lower mammals are used.

Many apes use their hands to build themselves nests in the trees or even to construct roofs between the branches to protect themselves against the weather, as the chimpanzee, for example, does. With their hands they grasp sticks to defend themselves against enemies, or bombard their enemies with fruits and stones. In captivity they use their hands for a number of simple operations copied from human beings.



Chimpanzee with Crude Spear

It is in this that one sees the great gulf between the undeveloped hand of even the most man-like apes and the human hand that has been highly perfected by hundreds of thousands of years of labour. The number and general arrangement of the bones and muscles are the same in both hands, but the hand of the lowest savage can perform hundreds of operations that no simian hand can imitate — no simian hand has ever fashioned even the crudest stone knife.

The first operations for which our ancestors gradually learned to adapt their hands during the many thousands of years of transition from ape to man could have been only very simple ones. The lowest savages, even those in whom regression to a more animal-like condition with a simultaneous physical degeneration can be assumed, are nevertheless far superior to these transitional beings. Before the first flint could be fashioned into a knife by human hands, a period of time probably elapsed in comparison with which the historical period known to us appears insignificant. But the decisive step had been taken, **the hand had become free** and could henceforth attain ever greater dexterity; the greater flexibility thus acquired was inherited and increased from generation to generation.

Stone Age Knife Blade

Thus the hand is not only the organ of labour, **it is also the product of labour**. Only by labour, by adaptation to ever new operations, through the inheritance of muscles, ligaments, and, over longer periods of time, bones that had undergone special development and the ever-renewed employment of this inherited finesse in new, more and more complicated operations, have given the human hand the high degree of perfection required to conjure into being the pictures of a Raphael, the statues of a Thorwaldsen, the music of a Paganini.[4]

Madonna of the Meadows painted by Raphael (1505)

But the hand did not exist alone; it was only one member of an integral, highly complex organism. And what benefited the hand, benefited also the whole body it served; and this in two ways.

In the first place, the body benefited from the law of correlation of growth, as Darwin called it. This law states that the specialised forms of separate parts of an organic being are always bound up with certain forms of other parts that apparently have no connection with them. Thus all animals that have red blood cells without cell nuclei, and in which the head is attached to the first vertebra by means of a double articulation (condyles), also without exception possess lacteal glands for suckling their young. Similarly, cloven hoofs in mammals are regularly associated with the possession of a multiple stomach for rumination.

Changes in certain forms involve changes in the form of other parts of the body, although we cannot explain the connection. Perfectly white cats with blue eyes are always, or almost always, deaf. The gradually increasing perfection of the human hand, and the commensurate adaptation of the feet for erect gait, have undoubtedly, by virtue of such correlation, reacted on other parts of the organism. However, this action has not as yet been sufficiently investigated for us to be able to do more here than to state the fact in general terms.

Much more important is the direct, demonstrable influence of the development of the hand on the rest of the organism. It has already been noted that our simian ancestors were gregarious; it is obviously impossible to seek the derivation of man, the most social of all animals, from non-gregarious immediate ancestors. Mastery over nature began with the development of the hand, with labour, and widened man's horizon at every new advance. He was continually discovering new, hitherto unknown properties in natural objects.

On the other hand, the development of labour necessarily helped to bring the members of society closer together by increasing cases of mutual support and joint activity, and by making clear the advantage of this joint activity to each individual. In short, men in the making arrived at the point where **they had something to say** to each other. Necessity created the organ; the undeveloped larynx of the ape was slowly but surely transformed by modulation to produce constantly more developed modulation, and the organs of the mouth gradually learned to pronounce one articulate sound after another.

...they had something to say to each other.

Comparison with animals proves that this explanation of the origin of language from and in the process of labour is the only correct one. The little that even the most highly-developed animals need to communicate to each other does not require articulate speech. In its natural state, no animal feels handicapped by its inability to speak or to understand human speech. It is quite different when it has been tamed by man. The dog and the horse, by association with man, have developed such a good ear for articulate speech that they easily learn to understand any language within their range of concept. Moreover they have acquired the capacity for feelings such as affection for man, gratitude, etc., which were previously foreign to them. Anyone who has had much to do with such animals will hardly be able to escape the conviction that in many cases they now feel their inability to speak as a defect, although, unfortunately, it is one that can no longer be remedied because their vocal organs are too specialised in a definite direction. However, where vocal organs exist, within certain limits even this inability disappears. The buccal organs of birds are as different from those of man as they can be, yet birds are the only animals that can learn to speak; and it is the bird with the most hideous voice, the parrot, that speaks best of all. Let no one object that the parrot does not understand what it says. It is true that for the sheer pleasure of talking and associating with human beings, the parrot will chatter for hours at a stretch, continually repeating its whole vocabulary. But within the limits of its range of concepts it can also learn to understand what it is saying. Teach a parrot swear words in such a way that it gets an idea of their meaning (one of the great amusements of sailors returning from the tropics); tease it and you will soon discover that it knows how to use its swear words just as correctly as a Berlin costermonger [street-trader]. The same is true of begging for titbits.

First labour, after it and then with it, speech — these were the two most essential stimuli under the influence of which the brain of the ape gradually changed into that of man, which, for all its similarity is far larger and more perfect. Hand in hand with the development of the brain went the development of its most immediate instruments — the senses. Just as the gradual development of speech is inevitably accompanied by a corresponding refinement of the organ of hearing, so the development of the brain as a whole is accompanied by a refinement of all the senses. The eagle sees much farther than man, but the human eye discerns considerably more in things than does the eye of the eagle. The dog has a far keener sense of smell than man, but it does not distinguish a hundredth part of the odours that for man are definite signs denoting different things.

And the sense of touch, which the ape hardly possesses in its crudest initial form, has been developed only side by side with the development of the human hand itself, through the medium of labour.

The reaction on labour and speech of the development of the brain and its attendant senses, of the increasing clarity of consciousness, power of abstraction and of conclusion, gave both labour and speech an ever-renewed impulse to further development. This development did not reach its conclusion when man finally became distinct from the ape, but on the whole made further powerful progress, its degree and direction varying among different peoples and at different times, and here and there even being interrupted by local or temporary regression.

This further development has been strongly urged forward, on the one hand, and guided along more definite directions, on the other, by a new element which came into play with the appearance of fully-fledged man, namely, **society**.

Hundreds of thousands of years — of no greater significance in the history of the Earth than one second in the life of man[5] — certainly elapsed before human society arose out of a troupe of tree-climbing monkeys. Yet it did finally appear.

And what do we find once more as the characteristic difference between the troupe of monkeys and human society?

Labour.

The ape herd was satisfied to browse over the feeding area determined for it by geographical conditions or the resistance of neighbouring herds; it undertook migrations and struggles to win new feeding grounds, but it was incapable of extracting from them more than they offered in their natural state, except that it unconsciously fertilised the soil with its own excrement. As soon as all possible feeding grounds were occupied, there could be no further increase in the ape population; the number of animals could at best remain stationary. But all animals waste a great deal of food, and, in addition, destroy in the germ the next generation of the food supply. Unlike the hunter, the wolf does not spare the doe which would provide it with the young the next year; the goats in Greece, that eat away the young bushes before they grow to maturity, have eaten bare all the mountains of the country.

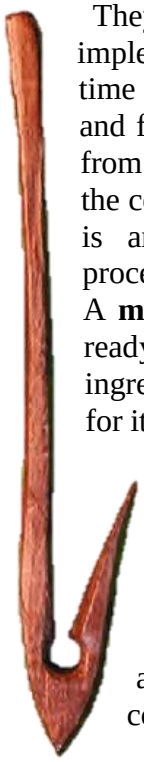
Modern Deforestation of the Amazon Rain Forest Has Played a Major Role in Climate Change.

This "predatory economy" of animals plays an important part in the gradual transformation of species by forcing them to adapt themselves to other than the usual food, thanks to which their blood acquires a different chemical composition and the whole physical constitution gradually alters, while species that have remained unadapted die out.

There is no doubt that this predatory economy contributed powerfully to the transition of our ancestors from ape to man. In a race of apes that far surpassed all others in intelligence and adaptability, this predatory economy must have led to a continual increase in the number of plants used for food and the consumption of more and more edible parts of food plants. In short, food became more and more varied, as did also the substances entering the body with it, substances that were the chemical premises for the transition to man.

But all that was not yet labour in the proper sense of the word. Labour begins with the making of tools.

And what are the most ancient tools that we find —– the most ancient judging by the heirlooms of prehistoric man that have been discovered, and by the mode of life of the earliest historical peoples and of the rawest of contemporary savages?



Bone Fish Hook

They are hunting and fishing implements, the former at the same time serving as weapons. But hunting and fishing presuppose the transition from an exclusively vegetable diet to the concomitant use of meat, and this is another important step in the process of transition from ape to man. A **meat diet** contained in an almost ready state the most essential ingredients required by the organism for its metabolism. By shortening the time required for digestion, it also shortened the other vegetative bodily processes that correspond to those of plant life, and thus gained further time, material and desire for the active manifestation of animal life proper.

San Painting: Hunter with Bow

And the farther man in the making moved from the vegetable kingdom the higher he rose above the animal. Just as becoming accustomed to a vegetable diet side by side with meat converted wild cats and dogs into the servants of man, so also adaptation to a meat diet, side by side with a vegetable diet, greatly contributed towards giving bodily strength and independence to man in the making.

The meat diet, however, had its greatest effect on the brain, which now received a far richer flow of the materials necessary for its nourishment and development, and which, therefore, could develop more rapidly and perfectly from generation to generation. With all due respect to the vegetarians man did not come into existence without a meat diet, and if the latter, among all peoples known to us, has led to cannibalism at some time or other (the forefathers of the Berliners, the Weletabians or Wilzians[6], used to eat their parents as late as the Tenth Century), that is of no consequence to us today.

The meat diet led to two new advances of decisive importance — the harnessing of fire and the domestication of animals. The first still further shortened the digestive process, as it provided the mouth with food already, as it were, half-digested; the second made meat more copious by opening up a new, more regular source of supply in addition to hunting, and moreover provided, in milk and its products, a new article of food at least as valuable as meat in its composition.

...the domestication of animals

Thus both these advances were, in themselves, new means for the emancipation of man. It would lead us too far afield to dwell here in detail on their indirect effects notwithstanding the great importance they have had for the development of man and society.

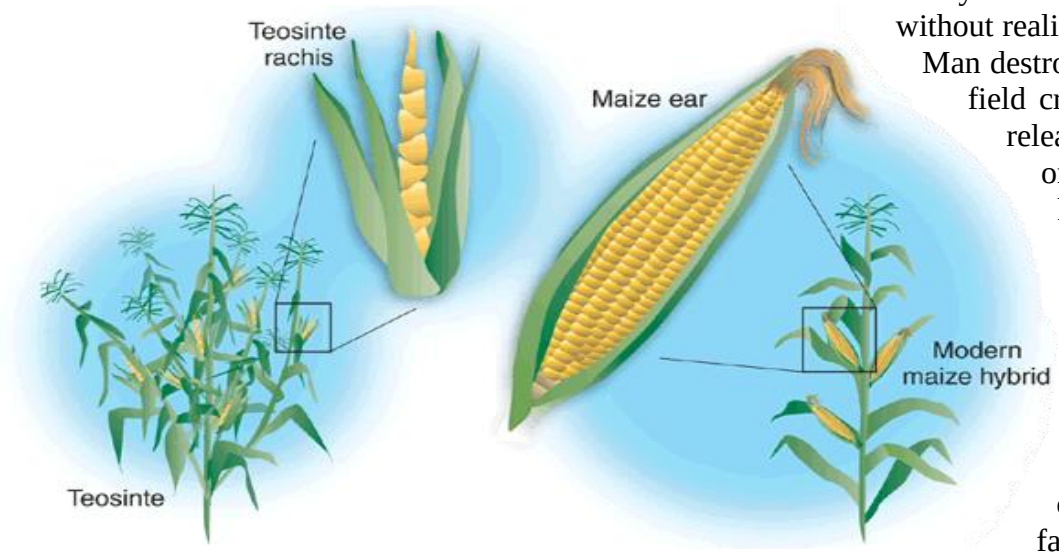
Just as man learned to consume everything edible, he also learned to live in any climate. He spread over the whole of the habitable world, being the only animal fully able to do so of its own accord. The other animals that have become accustomed to all climates — domestic animals and vermin — did not become so independently, but only in the wake of man. And the transition from the uniformly hot climate of the original home of man to colder regions, where the year was divided into summer and winter, created new requirements — shelter and clothing as protection against cold and damp, and hence new spheres of labour, new forms of activity, which further and further separated man from the animal.

By the combined functioning of hand, speech organs and brain, not only in each individual but also in society, men became capable of executing more and more complicated operations, and were able to set themselves, and achieve, higher and higher aims. The work of each generation itself became different, more perfect and more diversified. Agriculture was added to hunting and cattle raising; then came spinning, weaving, metalworking, pottery and navigation. Along with trade and industry, art and science finally appeared. Tribes developed into nations and states. Law and politics arose, and with them that fantastic reflection of human things in the human mind — religion. In the face of all these images, which appeared in the first place to be products of the mind and seemed to dominate human societies, the more modest productions of the working hand retreated into the background, the more so since the mind that planned the labour was able, at a very early stage in the development of society (for example, already in the primitive family), to have the labour that had been planned carried out by other hands than its own. All merit for the swift advance of civilisation was ascribed to the mind, to the development and activity of the brain.

Men became accustomed to explain their actions as arising out of thought instead of their needs (which in any case are reflected and perceived in the mind); and so in the course of time there emerged that idealistic world outlook which, especially since the fall of the world of antiquity, has dominated men's minds. It still rules them to such a degree that even the most materialistic natural scientists of the Darwinian school are still unable to form any clear idea of the origin of man, because under this ideological influence they do not recognise the part that has been played therein by labour.

Animals, as has already been pointed out, change the environment by their activities in the same way, even if not to the same extent, as man does, and these changes, as we have seen, in turn react upon and change those who made them.

In nature nothing takes place in isolation. Everything affects and is affected by every other thing, and it is mostly because this manifold motion and interaction is forgotten that our natural scientists are prevented from gaining a clear insight into the simplest things. We have seen how goats have prevented the regeneration of forests in Greece; on the island of St. Helena[6], goats and pigs brought by the first arrivals have succeeded in exterminating its old vegetation almost completely, and so have prepared the ground for the spreading of plants brought by later sailors and colonists. But animals exert a lasting effect on their environment unintentionally and, as far as the animals themselves are concerned, accidentally. The further removed men are from animals, however, the more their effect on nature assumes the character of premeditated, planned action directed towards definite preconceived ends. The animal destroys the vegetation of a locality without realising what it is doing. Man destroys it in order to sow field crops on the soil thus released, or to plant trees or vines which he knows will yield many times the amount planted. He transfers useful plants and domestic animals from one country to another and thus changes the flora and fauna of whole continents. More than this. Through artificial breeding both plants and animals are so changed by the hand of man that they become unrecognisable. The wild plants from which our grain varieties originated are still being sought in vain. There is still some dispute about the wild animals from which our very different breeds of dogs or our equally numerous breeds of horses are descended.



It goes without saying that it would not occur to us to dispute the ability of animals to act in a planned, premeditated fashion. On the contrary, a planned mode of action exists in embryo wherever protoplasm, living albumen, exists and reacts, that is, carries out definite, even if extremely simple, movements as a result of definite external stimuli. Such reaction takes place even where there is yet no cell at all, far less a nerve cell. There is something of the planned action in the way insect-eating plants capture their prey, although they do it quite unconsciously. In animals the capacity for conscious, planned action is proportional to the development of the nervous system, and among mammals it attains a fairly high level. While fox-hunting in England one can daily observe how unerringly the fox makes use of its excellent knowledge of the locality in order to elude its pursuers, and how well it knows and turns to account all favourable features of the ground that cause the scent to be lost. Among our domestic animals, more highly developed thanks to association with man, one can constantly observe acts of cunning on exactly the same level as those of children. For, just as the development history of the human embryo in the mother's womb is only an abbreviated repetition of the history, extending over millions of years, of the bodily development of our animal ancestors, starting from the worm, so the mental development of the human child is only a still more abbreviated repetition of the intellectual development of these same ancestors, at least of the later ones. But all the planned action of all animals has never succeeded in impressing the stamp of their will upon the earth. That was left for man.

In short, the animal merely **uses** its environment, and brings about changes in it simply by its presence; man by his changes makes it serve his ends**, masters** it. This is the final, essential distinction between man and other animals, and once again it is labour that brings about this distinction.

Let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first. The people who, in Mesopotamia, Greece, Asia Minor and elsewhere, destroyed the forests to obtain cultivable land, never dreamed that by removing along with the forests the collecting centres and reservoirs of moisture they were laying the basis for the present forlorn state of those countries. When the Italians of the Alps used up the pine forests on the southern slopes, so carefully cherished on the northern slopes, they had no inkling that by doing so they were cutting at the roots of the dairy industry in their region; they had still less inkling that they were thereby depriving their mountain springs of water for the greater part of the year, and making it possible for them to pour still more furious torrents on the plains during the rainy seasons.

Scrofula

Those who spread the potato in Europe were not aware that with these farinaceous tubers they were at the same time spreading scrofula.[7] Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature —– but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly.

And, in fact, with every day that passes we are acquiring a better understanding of these laws and getting to perceive both the more immediate and the more remote consequences of our interference with the traditional course of nature. In particular, after the mighty advances made by the natural sciences in the present century, we are more than ever in a position to realise, and hence to control, also the more remote natural consequences of at least our day-to-day production activities. But the more this progresses the more will men not only feel but also know their oneness with nature, and the more impossible will become the senseless and unnatural idea of a contrast between mind and matter, man and nature, soul and body, such as arose after the decline of classical antiquity in Europe and obtained its highest elaboration in Christianity.

It required the labour of thousands of years for us to learn a little of how to calculate the more remote natural effects of our actions in the field of production, but it has been still more difficult in regard to the more remote social effects of these actions. We mentioned the potato and the resulting spread of scrofula.

Irish Potato Famine

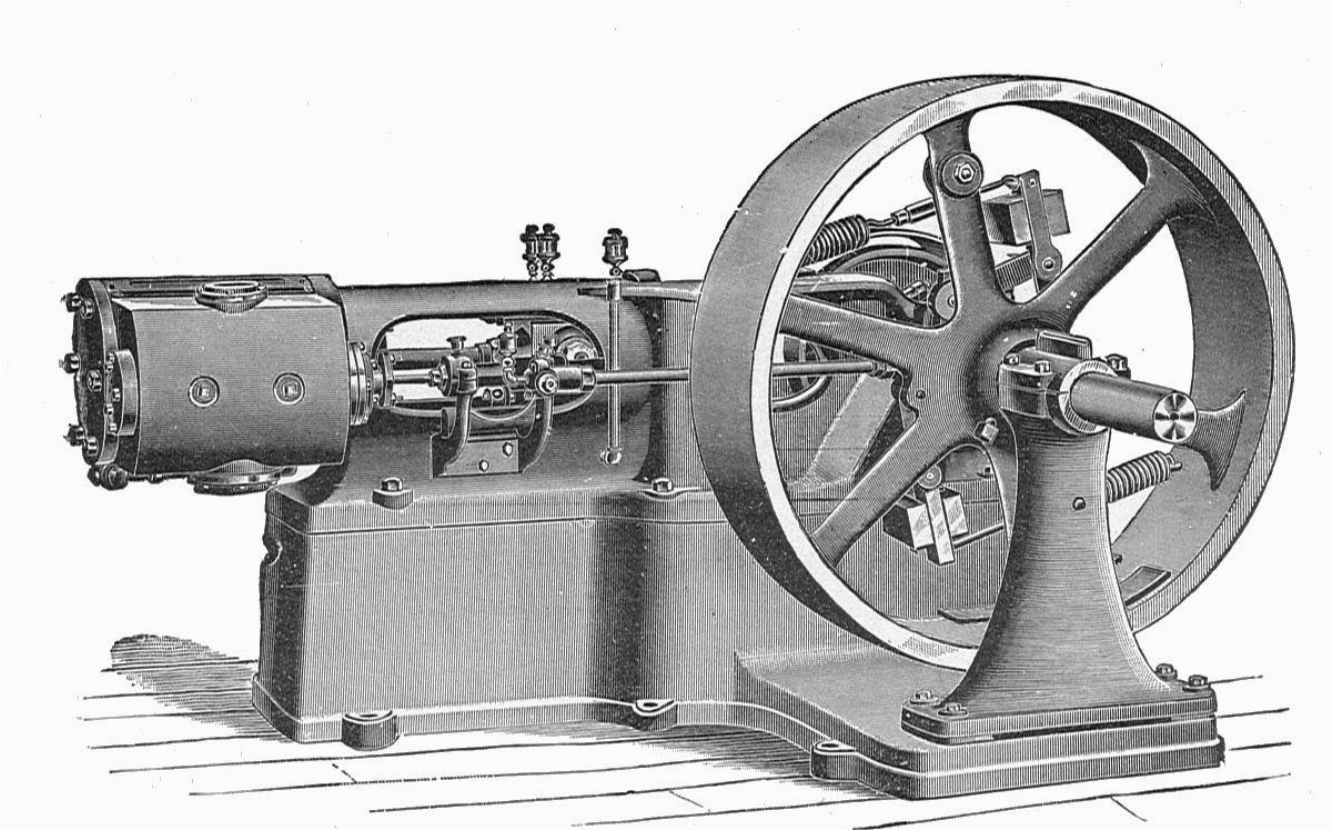
But what is scrofula compared to the effects which the reduction of the workers to a potato diet had on the living conditions of the popular masses in whole countries, or compared to the famine the potato blight brought to Ireland in 1847[8], which consigned to the grave a million Irishmen, nourished solely or almost exclusively on potatoes, and forced the emigration overseas of two million more?

When the Arabs learned to distil spirits, it never entered their heads that by so doing they were creating one of the chief weapons for the annihilation of the aborigines of the then still undiscovered American continent.

And when afterwards Columbus discovered this America, he did not know that by doing so he was giving a new lease of life to slavery, which in Europe had long ago been done away with, and laying the basis for the Negro slave trade.

The men who in the Seventeenth and Eighteenth Centuries laboured to create the steam-engine had no idea that they were preparing the instrument which more than any other was to revolutionise social relations throughout the world.

Especially in Europe, by concentrating wealth in the hands of a minority and dispossessing the huge majority, this instrument was destined at first to give social and political domination to the bourgeoisie, but later, to give rise to a class struggle between bourgeoisie and proletariat which can end only in the overthrow of the bourgeoisie and the abolition of all class antagonisms. But in this sphere too, by long and often cruel experience and by collecting and analysing historical material, we are gradually learning to get a clear view of the indirect, more remote social effects of our production activity, and so are afforded an opportunity to control and regulate these effects as well.



...the steam engine ... was destined …to give social and political domination to the bourgeoisie…

This regulation, however, requires something more than mere knowledge. It requires a complete revolution in our hitherto existing mode of production, and simultaneously a revolution in our whole contemporary social order.

All hitherto existing modes of production have aimed merely at achieving the most immediately and directly useful effect of labour. The further consequences, which appear only later and become effective through gradual repetition and accumulation, were totally neglected. The original common ownership of land corresponded, on the one hand, to a level of development of human beings in which their horizon was restricted in general to what lay immediately available, and presupposed, on the other hand, a certain superfluity of land that would allow some latitude for correcting the possible bad results of this primeval type of economy.

When this surplus land was exhausted, common ownership also declined. All higher forms of production, however, led to the division of the population into different classes and thereby to the antagonism of ruling and oppressed classes.

Thus the interests of the ruling class became the driving factor of production, since production was no longer restricted to providing the barest means of subsistence for the oppressed people. This has been put into effect most completely in the capitalist mode of production prevailing today in Western Europe. The individual capitalists, who dominate production and exchange, are able to concern themselves only with the most immediate useful effect of their actions. Indeed, even this useful effect — inasmuch as it is a question of the usefulness of the article that is produced or exchanged — retreats far into the background, and the sole incentive becomes the profit to be made on selling.

Classical political economy, the social science of the bourgeoisie, in the main examines only social effects of human actions in the fields of production and exchange that are actually intended. This fully corresponds to the social organisation of which it is the theoretical expression. As individual capitalists are engaged in production and exchange for the sake of the immediate profit, only the nearest, most immediate results must first be taken into account. As long as the individual manufacturer or merchant sells a manufactured or purchased commodity with the usual coveted profit, he is satisfied and does not concern himself with what afterwards becomes of the commodity and its purchasers. The same thing applies to the natural effects of the same actions. What cared the Spanish planters in Cuba, who burned down forests on the slopes of the mountains and obtained from the ashes sufficient fertiliser for one generation of very highly profitable coffee trees — what cared they that the heavy tropical rainfall afterwards washed away the unprotected upper stratum of the soil, leaving behind only bare rock!

In relation to nature, as to society, the present mode of production is predominantly concerned only about the immediate, the most tangible result; and then surprise is expressed that the more remote effects of actions directed to this end turn out to be quite different, are mostly quite the opposite in character; that the harmony of supply and demand is transformed into the very reverse opposite, as shown by the course of each ten years' industrial cycle — even Germany has had a little preliminary experience of it in the 'crash'; that private ownership based on one's own labour must of necessity develop into the expropriation of the workers, while all wealth becomes more and more concentrated in the hands of non-workers.

Notes

1. TERTIARY PERIOD**:** This is the former term for the geological period from 66 million to 2.58 million years ago, a timespan that occurs between the Secondary period and the Quaternary. The Tertiary is no longer recognised as a formal unit by the International Commission on Stratigraphy, but the word is still widely used. The period began with the demise of the non-birdlike dinosaurs in the Cretaceous–Paleogene extinction event, at the start of the Cenozoic Era, and extended to the beginning of the Quaternary glaciation at the end of the Pliocene Epoch.

2. In the 1870s, when this was written, British zoo-geographer Philip Lutley Sclater put forth the theory that a continent (he called 'Lemuria') existed which reached from modern Madagascar to India and Sumatra — and this continent has since submerged beneath the Indian Ocean. Although this theory was wrong, it was not entirely wrong. Modern continental drift theory has shown how land masses drifted in different directions and how indeed some areas that were once dry land are now beneath the sea and other areas which were once beneath the sea are now dry land.

3. DARWIN: Charles Robert Darwin (1809-1882) is commonly believed to be the originator of the idea that higher species evolved from lower species. This is not true. Before Darwin the ancient Greek philosophers Anaximander of Miletus (C.610-C.546 BCE) and Empidocles of Arkagas (C.490-C.430 BCE) had put forward the concept of evolution. In more recent times, the first person to advance the idea was the French Naturalist Pierre Louis Maupertuis (1698-1759) who in 1751 said:

"…in the fortuitous combinations of the productions of nature, as there must be some characterised by certain relations of fitness which are able to subsist, it is not to be wondered at that this fitness is present in all the species that are currently in existence? Chance… produced an innumerable multitude of individuals; a small number found themselves constructed in such a manner that the parts of the animal were able to satisfy its needs; in another infinitely greater number, there was neither fitness nor order: all of these latter have perished… these species, which we see today, are but the smallest part of what blind destiny has produced."

But it was another French naturalist, Jean-Baptiste Lamarck (1769-1832), who was the first to develop a consistent theory of evolution. He believed that animals adapted to their environment and that characteristics developed during the lifetime of an individual could be carried on to the next generation. This concept is known as 'epigenetics'.

5. ENGELS' NOTE: A leading authority in this respect, Sir William Thomson, has calculated that little more than a hundred million years could have elapsed since the time when the Earth had cooled sufficiently for plants and animals to be able to live on it.

PAINTING: 'WORK' BY FORD MADDOX BROWN (1863)

INTERNATIONAL

Zimbabwe Communist Party
Statement

RECENT EVENTS IN LATIN AMERICA

14th NOVEMBER 2019

Firstly, the Zimbabwe Communist Party condemns absolutely the military coup against the progressive, democratically elected government of Bolivia and its President, Comrade Evo Morales. In Bolivia, the pretence that economic failures have been the major cause of the fall of progressive governments in Latin America does not hold. Bolivia has a record of healthy economic growth and reduction of poverty since Evo Morales took over the leadership in 2006.

Very recently we have seen an escalation of class and anti-imperialist struggle across Latin America. The Trump Administration has resurrected the Monroe Doctrine, first declared in 1823 by US President James Monroe. This doctrine conceptualises the whole of the Americas as the sphere of influence of the United States while reducing its involvement in the rest of the world. Only last month, 13th October 2019, Trump ordered troops out of Syria, then, in a statement on 16th October 2019 said "I'm embarrassed to say how many countries the US military is in. It is so foolish."

But in the Americas, it is a different story. Immediately after Donald Trump became President of the United States of America in 2017, he renewed the sanctions against Cuba which had been imposed in 1961 but progressively lifted by the Obama administration in the hopes of destabilising Cuba from the inside.

The Trump administration has systematically tightened sanctions on Cuba including supplementary sanctions and lawsuits on foreign companies doing business with Cuba. These sanctions are in part due to the Cuban assistance to Venezuela whose oil the United States is eager to steal. Venezuela has, in return for political and medical assistance, been sending oil to Cuba.

On 7th November 2019, the UN General Assembly voted by 187 votes to 3 for the dropping of sanctions against Cuba. The countries which voted **against** the dropping of sanctions were the USA, Israel and Brazil, with Colombia and Ukraine abstaining and Moldova not voting.

Venezuela has so far been able to fight off the US régime change agenda, in which, like most other Latin American countries, the powerful local oligarchs have treacherously consorted with the USA against the national interests of their various countries and in particular against the class interests of workers, peasants and poor, who they have traditionally treated with contempt.

Meanwhile, we have seen the release from prison of former progressive Brazilian president Luiz Inácio Lula da Silva. Lula who had served very successfully as president from 2003-2010, was prevented from standing again at a time when opinion polls indicated that he would have won the election. He was arrested and imprisoned under trumped up charges by a judiciary with strong links to the corrupt and violent Brazilian oligarchy. The extreme reactionary régime of Jair Bolsonaro who came unto office in January 2019 has been devastating in its removal of rights to the poorest people. The removal of all restraints to the destruction of the Amazon Rain Forest and the subsequent fire has made the Bolsonaro régime a danger to the whole world as we struggle with climate change.

In Argentina, the victory of President-elect Alberto Fernández with Cristina Fernández de Kirchner as Vice-President towards the end of October 2019 is a blow to the United States dream of controlling the whole South American continent. Kirchner was President of Argentina from 2007 to 2015, whose presidency improved the lives of the majority of Argentinians. She, like Lula, was brought down by the right-wing media. The government that followed, that of Mauricio Macri, introduced a policy of austerity which has deepened poverty in the country. Macri has now been defeated. President Fernández will assume office on the 1st January 2020.

Meanwhile, in Chile, massive demonstrations are still taking place in response to the austerity measures introduced by billionaire President Sebastian Piñera. Hundreds of thousands have poured on to the streets of major cities, no longer frightened by the army and police.

In Ecuador, the progressive President Rafael Correa was followed into office by his former Vice-President, Lenin Moreno in 2017 who immediately sold out to the IMF and the United States. The austerity demanded by the IMF led him to reverse the social reforms of President Correa and rapidly lost Moreno his support from the people. In October 2019 huge demonstrations made him leave the Ecuadorean capital Quito. Moreno was then forced to reverse some of his reactionary policies.

Despite the recent reversal in Bolivia, the people of Latin America are fighting back. Revolutionary and counter-revolutionary forces are engaged in intense struggle. But it is obvious that the time that Latin American people would meekly accept the poverty expected of them by the United States and their own oligarchs has gone. The people will surely win.

Africa must learn from the unity shown by the progressive forces of Latin America led by the Republic of Cuba. The discredited neo-liberal monetarist policies being pursued in Zimbabwe by Mthuli Ncube and which Tito Mboweni is now trying to dictate to South Africa can do nothing other than push people further into poverty.

The government and people of Bolivia led by Evo Morales demonstrated the way in which an impoverished but mineral rich country can organise its economy for the benefit of the people. But the reactionary coup has vividly demonstrated that while those who have looted are allowed to retain their wealth, they will use some of that wealth to bribe and to continue to control the state machine and the media. They will find a way to overthrow a government of the people. In Bolivia, the government was overthrown by the state. 'Democracy' is of no consequence to them if their power and luxurious lifestyles come under the slightest threat.

In following events in Latin America, Zimbabweans and other Africans must learn from both the successes and the errors of the popular and revolutionary forces.

Issued by the Secretariat of the Zimbabwe Communist Party

EVO MORALES,
PRESIDENT OF BOLIVIA
2006-2019

RACIST COUP IN BOLIVIA

Revolutionary President, Comrade Evo Morales, Removed from Office

by Alan MacLeod, Mintpress News

18th NOVEMBER 2019

BOLIVIANS FIGHT BACK AGAINST THE COUP

Both the corporate media and human rights groups have been silent as journalists and indigenous protesters have been targeted as Bolivia's self-declared right-wing government uses violence to secure its tenuous hold on power

Despite having been in power for only one week, the new Bolivian coup government of Jeanine Añez has already turned the powers of repression onto the population, using live rounds on demonstrators protesting the forceful removal of President Evo Morales from power on 10th November.

Morales has sought asylum in Mexico. The death toll, according to Bolivia's national ombudsman, has risen to 23, with more than one thousand people arrested. That figure includes the victims of the Cochabamba massacre, where soldiers and police killed nine indigenous protesters on Friday.

The full scope of the armed forces has been unleashed on demonstrators, with security forces using live ammunition, tanks and even attack helicopters to destroy resistance to the coup. Much of Bolivia's security state, including many of the leaders of the coup, were trained by the FBI and by the notorious School of the Americas in Fort Benning, GA, a US Army installation where many of the most brutal death squads and torturers in Latin American history cut their teeth. Those skills are now on show in Cochabamba.

"Death squads unleashed in Bolivia: the coup regime has granted immunity to soldiers who shoot protesters. In just days they've shot hundreds of people," announced Green Party Presidential candidate Jill Stein via Twitter. Images and videos of the deadly events immediately began circulating on social media. The scenes of panicked protesters fleeing gunshots or desperately checking dead or dying bodies shocked many: "We're watching the rounding up and killing of indigenous people in Bolivia in real time by right wing forces supported by the US. This should be a top story," said journalist Rania Khalek.

But the massacre is largely being downplayed in the mainstream press, who overwhelmingly supported former President Morales' ouster, framing events not as a coup, but as Morales 'resigning' from office. When reported on at all, the events are often euphemistically referred to as a 'clash' between Morales supporters and government forces, removing all agency and culpability from their headlines. To date, no mainstream Western outlet has used the word 'massacre' or similar words, in headlines to describe the event.

Likewise, the crescendo of violence has elicited a muted response from the professional human rights industry. Indeed, as hundreds of casualties were being taken to hospital, Human Rights Watch Director Ken Roth all but came out to support the coup, declaring that Añez's coup was actually "defending democracy" against the "electoral fraud" of Morales. Both Human Rights Watch and Amnesty International refused to condemn the coup or the repression in their statements on the violence.

Hospitals across the country have been inundated with hundreds of people injured during the crackdown, a problem made worse by the fact that the new government has attacked, detained or deported hundreds of Cuban medical personnel who constitute the backbone of Bolivia's public health services.

A LICENSE TO KILL FOR BOLIVIA'S SECURITY SERVICES

Añez ominously announced that she is committed to "taking all measures necessary" to "pacify the country." This included an official order pre-exonerating all security services from any crimes committed during the "re-establishment of order," effectively giving the army and the police a license to kill anyone who resists the new government.

Añez, a fundamentalist Christian, first arrived at the Presidential Palace in La Paz on the 12th November brandishing an oversized, leather-bound Bible, shouting at reporters "the Bible is returning" to Bolivia. She has previously declared the country's indigenous population (who make up, by most counts, almost 90% of the population) as 'satanic' and claimed that they should not be allowed to live in Bolivia's cities, only in the desert or highlands.

Morales was the country's first indigenous ruler since the Spanish invasion five centuries previously. Security forces loyal to Añez publicly removed and burned the indigenous Wiphala flag patches from their uniforms, a symbolic gesture showing their commitment to the re-establishment of a white supremacist state.

Añez's party, the Democrat Social Movement, won 4% of the vote in the October elections, making it the fourth-largest party in the country. In comparison, Morales received 47%. Nevertheless, the United States government has lent its full support to Añez, the White House 'applauding' the military overthrow. Likewise, media has presented her positively as a "women's activist" "setting a conservative, religious tone".

Her colleagues in government share similar far-right backgrounds. Coup leader Luis Fernando Camacho is part of a Neo-Nazi paramilitary group that wears the Iron Cross and other fascist regalia and practices the Roman (Sieg Heil) salute.

A WAR ON THE MEDIA

However, Bolivia's indigenous population is not the only target of police and military repression; multiple journalists covering the protests have also been shot. Meanwhile, *Al-Jazeera* correspondent Teresa Bo was tear-gassed in the face live on air at point-blank range by riot police, as she stood alone, away from the protests, talking to camera. The new government forced Bolivia TV off the air, while one *TeleSUR* journalist in Bolivia found that virtually every channel was dedicated to Añez. Her new Communications Minister, Roxanna Lizárrage announced that she intends to persecute journalists involved in what she called 'sedition', adding that she already has compiled a list of "troublesome members of the media."

Organized resistance, from indigenous groups, trade unions and Morales' Movement to Socialism party appears to be growing. However, the new government has made it absolutely clear that it intends to stay in power by any means necessary. The following few days will decide what direction Bolivia will take.

Alan MacLeod *is a MintPress Staff Writer as well as an academic and writer for Fairness and Accuracy in Reporting. His book, Bad News From Venezuela: Twenty Years of Fake News and Misreporting was published in April.*

INDIGENOUS BOLIVIANS HOLD OUT AGAINST THE COUP

WHAT THE COUP AGAINST EVO MORALES MEANS TO INDIGENOUS PEOPLE LIKE ME

by Nick Estes

14th NOVEMBER 2019

"My sin was being indigenous, leftist, and anti-imperialist,"

Evo Morales is more than Bolivia's first indigenous president — he is our president, too. The rise of a humble Aymara coca farmer to the nation's highest office in 2006 marked the arrival of indigenous people as vanguards of history. Within the social movements that brought him to power emerged indigenous visions of socialism and the values of Pachamama (the Andean Earth Mother). Evo represents five centuries of indigenous deprivation and struggle in the hemisphere.

A coup against Evo, therefore, is a coup against indigenous people.

Evo's critics, from the anti-state left and right, are quick to point out his failures. But it was his victories that fomented this most recent violent backlash.

Evo and his party, the indigenous-led Movement for Socialism (MAS in Spanish), nationalized key industries and used bold social spending to shrink extreme poverty by more than half, lowering the country's Gini coefficient, which measures income inequality, by a remarkable 19%. During Evo's and MAS's tenure, much of Bolivia's indigenous-majority population has, for the first time in their lives, lived above poverty.

The achievements were more than economic. Bolivia made a great leap forward in indigenous rights.

Once at the margins of society, indigenous languages and culture have been thoroughly incorporated into Bolivia's plurinational model. The indigenous Andean concept of Bien Vivir, which promotes living in harmony with one another and the natural world, was written into the country's constitution becoming a measure for institutional reform and social progress. The Wiphala, an indigenous multicolor flag, became a national flag next to the tricolor, and 36 indigenous languages became official national languages alongside Spanish.

Evo's indigenous socialism has become the standard bearer for the international indigenous community. The esteemed Maori jurist, Moana Jackson, once referred to Bolivia's 2009 constitution as the "nearest thing in the world to a constitution that has come from an indigenous kaupapa (a communal vision)."

The indigenous-socialist project accomplished what neoliberalism has repeatedly failed to do: redistribute wealth to society's poorest sectors and uplift those most marginalized. Under Evo and MAS leadership, Bolivia liberated itself as a resource colony. Before the coup, Evo attempted to nationalize its large lithium reserves, an element necessary for electric cars. Since the coup, Tesla's stocks have skyrocketed. Bolivia rebuked imperialist states like the United States and Canada by taking the path of resource nationalism to redistribute profits across society.

This was Evo's crime.

"My sin was being indigenous, leftist, and anti-imperialist," Evo said after being coerced into resigning this week.

His replacement, Jeanine Añez Chávez, agreed. “I dream of a Bolivia free of satanic indigenous rites,” the opposition senator tweeted in 2013, “the city is not for the Indians who should stay in the highlands or the Chaco!!!” After Evo’s departure, Chavez declared herself interim president while holding up a large Bible, though she failed to get the required quorum in the senate to do so.

Next to her stood Luis Fernando Camacho, a member of the Christian far-right. After Evo’s resignation, Camacho stormed the presidential palace, a flag in one hand and a bible in the other. “The bible is returning to the government palace,” a pastor said on a video while standing next to Camacho. “Pachamama will never return. Today Christ is returning to the Government Palace. Bolivia is for Christ.”

In places where the opposition is strongest, Wiphala flags, symbols of indigenous pride, were lowered and burned. Police officers cut the flags from their uniforms. What were symbolic acts quickly escalated into street-level violence.

MAS members’ houses were burned. Evo’s home was ransacked. Masked armed men began rounding up suspected MAS supporters and indigenous people in the streets, loading them into the back of trucks. A handful of protesters have been killed. The same social movements that ushered Evo and MAS into power have taken to the streets to defend the gains of their indigenous revolution.

Amidst the chaos, anti-indigenous race-hatred has gripped the country since Evo’s 20th October re-election. While left critics continue to rail against Evo, paradoxically blaming him for the coup that overthrew him, no evidence has emerged of election fraud. The Organization of American States cited ‘irregularities’ without yet providing documentation. A report by the Center for Economic and Policy Research, however, found no irregularities and no fraud.

To appease critics, Evo even agreed to re-elections but was forced to resign under orders from the military and escalating rightwing violence. No one resigns with a gun pointed to their head. Clearly, it was a coup.

Fearing assassination, Evo fled to Mexico where he was granted asylum and greeted by a cheering crowd.

The future of Bolivia is currently marching in the streets, the millions of people who voted for Evo in the last elections, the 47% whose voices and votes were stolen by the violent return of the old, colonial oligarchy.

Other critics still contend that Evo’s 13-year tenure was too long. They mention Evo losing a referendum to amend constitution but failing to note the Supreme Court ruling that allowed him legally to run for another term. For our indigenous president, after five centuries of colonization, 13 years was not long enough.

“We will come back,” Evo recently assured supporters, quoting the 18th century indigenous resistance leader, “and we will be millions as Tupac (Katari) said.”

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THE EU AND BREXIT

Questions and Answers

Communist Party

This briefing was prepared early in 2019 by the Communist Party of Britain for distribution among trade union and Labour Party activists. We republish it here to deal with the confusion among Zimbabweans over this important political and economic issue.

Q1. What is the European Union (EU)?

The European Union is a political and economic union of 28 Member States with an estimated population of about 513 million. Its origins lie in post-war reconstruction and the Cold War, when the first attempts were made to construct a political, military and economic power bloc in Western Europe. Although the plans to establish a pro-NATO, anti-Soviet European Defence Community and European Political Community were defeated in 1954, the European Iron and Steel Community survived to form the basis of the European Economic Community in 1957 alongside the new European Atomic Energy Community (Euratom).

The UK joined the European Communities in 1973, despite widespread opposition on the left and in the labour movement. Since then, the EU — as it became — has taken big steps towards that original goal of a political, military and economic union.

The EU has since developed an internal Single Market and a Customs Union through a standardised system of Rules, Directives and Regulations which apply in all Member States to major areas of the economy (notably competition, trade, investment, agriculture, fisheries, public finances, VAT and trading standards), employment and social policy (including hours of work, leave, health and safety, gender equality and consumer rights), and the environment (including pollution and waste management).

Q2. How is the EU structured?

The heads of state or government of the EU Member States meet as a European Council at least four times a year. They and their subsidiary councils of ministers in specific matters give political direction to the development and operation of EU policies. In reality, though, the EU Commission nominated between the Member States and the Council uses its treaty-based powers to initiate, draft and police EU legislation and control the operations of the EU. The President of the Commission is currently Jean-Claude Juncker (who when Prime Minister turned Luxembourg into a major corporate tax haven). There is a European Parliament with 751 MEPs elected every five years in national or regional constituencies.

Q3. What are the basic EU Treaties?

The Treaty on the Functioning of the European Union (TFEU, based on the 1957 Treaty of Rome) and the Treaty on European Union (TEU, based on the 1992 Maastricht Treaty amended by the 1998 Amsterdam Treaty) were revised and consolidated as such by the 2009 Treaty of Lisbon (the 'Constitutional Treaty'). The peoples of France and the Netherlands had rejected a European Constitution in referendums in 2005. Referendums planned for the UK and five other EU Member States were then cancelled.

The Constitution was repackaged as the Treaty of Lisbon and rejected in the only referendum allowed, in the Irish Republic in 2008. The result was reversed by another referendum in 2009 and the Treaty adopted. It introduced Qualified Majority Voting in the Council of Ministers (the UK has about 8% of the votes), an unelected President of the Commission, an unelected High Representative for Foreign and Security Policy and a substantial military dimension for the EU.

Q4. What are the 'four freedoms'?

EU Treaties and Directives aim to ensure the free movement of goods, services, capital and labour within the internal market (and the free movement of capital between Member States and the outside world). The EU 'right of establishment' empowers companies in one EU country to set up and conduct operations in any other EU Member State.

These 'freedoms' implement the principle of an 'open market economy' proclaimed five times in the TEU and TFEU. These are the main reasons why most of the big capitalist monopolies and big business organisations across Europe — including the CBI and Institute of Directors — support EU membership.

Q5. What about the free movement of people?

The free movement of labour and workers is also presented in EU treaties as the 'free movement of *persons*', in the attempt to humanise the main aim of maximising profit through the exploitation of mobile labour power. For travel, work and residency within the EU 'Schengen Area' of 22 Member States (due to become 26), passport and most other controls have been abolished (although some were partially reintroduced during the 2015 migrant crisis). The UK and the Republic of Ireland are not part of the Schengen Area and so still have the power to operate passport controls within the EU.

The EU's 'free movement of labour' principle and its Posted Workers Directive empower companies to employ and transfer workers across national borders, sometimes undermining local pay, conditions and trade union agreements.

Q6. How is the EU Budget distributed?

There are usually nine EU Member States that contribute a net amount to the EU Budget and around 12 countries that usually receive over one million Euros from the Budget. The largest net contributor is Germany followed by France and Italy contributing about the same amount with the UK close behind. Poland is by far the largest net recipient of EU funding followed by Greece, Hungary, Spain, Belgium and Portugal. More than one-third of the EU Budget is spent on the Common Agricultural Policy, less than one-quarter on regional development and 7% on aid to developing countries.

Q7. How much does the UK pay into the EU?

In 2017, the UK's gross contribution to the EU Budget amounted to £18.6bn (or £358m a week). Receipts from EU funds and Britain's rebate added up to £4.1bn and £5.6bn, respectively. That leaves a net contribution from the UK to the EU of £8.1bn. In short, all the spending by EU funds in Britain is more than affordable in future from the savings of non-membership. In addition, up to £8bn a year would be available for extra spending on, say, housing, the NHS, education, social benefits, pensions and overseas aid or for National Debt repayment or tax reductions.

Q8. What is the European Court of Justice?

The ECJ is the highest court of the European Union in matters of EU law, but not national law unless this is in conflict with EU Treaties and Directives. Its judges are nominated and approved by the Member States.

In a series of rulings (the Viking, Laval, Ruffert, Luxembourg, Alemo-Herron and Woolworths cases) the ECJ has upheld the right of companies to defy collective agreements and national and provincial legislation in their treatment of 'posted' (imported), outsourced and redundant workers. These judgements uphold EU business freedoms at the expense of local wages, conditions and the right of trade unions to strike in their defence.

The ECJ is not to be confused with the European Court of Human Rights (see QX)

Q9. What is the Eurozone?

Monetary union began in 1990 and 19 EU Member States have adopted the Euro since 1999. In preparation, Britain entered the European Monetary System in 1990 before crashing out with soaring interest rates, prices and unemployment on 'Black Wednesday', September 1992.

Prime Minister Tony Blair recommenced preparations by granting 'independence' to the Bank of England in 1997, but Chancellor Gordon Brown vetoed adopting the Euro in place of the pound.

Operated by the European Central Bank and policed by the European Commission, Eurozone policy prioritises fiscal conservatism and low inflation above public investment, economic expansion and full employment.

Q10. What is the European Central Bank?

The ECB was established by the Treaty of Amsterdam in 1998 with the objective of ensuring 'price stability' in line with a very low, calculated rate of inflation.

The President of the ECB is Mario Draghi, formerly governor of the Bank of Italy, member of the World Bank and managing director of the Goldman Sachs international division.

The Governing Council is made up of the governors of the national central banks of the 19 Eurozone countries. The TFEU makes clear that the ECB must operate its monetarist policies independent of any elected or appointed EU or national Member State body.

Q11. Is the EU to blame for austerity?

Right-wing governments are usually happy to cut social and welfare spending, privatise public assets and cut taxes for the rich and big business.

The EU presses all Member State governments to do likewise. The TFEU's Stability and Growth Pact subjects all Member States (not just the 19 members of the Eurozone) to annual monitoring by the European Commission and the Council of Ministers. Every country is obliged to limit public sector borrowing to 3% of GDP and debt to 60%.

Breaches are subject to an Excess Deficit Procedure (EDP) to achieve this 'convergence'. The UK was removed from the EDP recently as the Tory government's austerity policies were on course to meet EU targets.

From 2010, the EU Commission-ECB-IMF 'Troika' granted loans and 'bond swaps' to eight EU Member States to assist the bail-outs of banks and financial systems. In return, national governments had to impose sweeping public spending cuts, tax rises and labour 'flexibility' reforms. Those that resisted were removed in 2011 and replaced by unelected technocrats acceptable to the 'Troika' (see QX).

In December 2018, the EU Commission, ECB and bond markets forced the Italian government to cut spending on pensions and unemployment benefit, even though its budget obeyed the 3% deficit rule.

Q12. Is the EU democratic?

Although the European Parliament is directly elected, this is on a scale (one MEP per half a million electors — almost ten times the Westminster ratio) that breaks any organic link between the people and their representatives.

The EU parliament does not have the powers normally associated with parliaments in a democracy: to initiate legislation, appoint and control the executive (the government or in this case the Council of Ministers), determine the Budget or effectively call the civil service — the Commission — to account. It merely shares decision-making with the Council of Ministers to amend and approve any legislation brought to it by the EU Commission.

Pressure from the EU and its supporters has forced countries to re-run referendums that do not produce a pro-EU result (e.g. Denmark 1993, Ireland 2002 and 2009).

When elected governments in Greece and Italy refused to carry out stricter austerity policies in line with the EU Stability and Growth Pact, they were forced from office in 2011 by the 'Troika' (the Commission, ECB and IMF) and replaced by unelected regimes headed by former top EU officials. In December 2018, the Commission and financial markets compelled the Italian government to abandon plans to boost unemployment benefits and pensions.

Q13. Isn't the EU a force for peace and stability in Europe and the world?

The EU has expanded alongside NATO across eastern Europe, the Baltic states and other former Soviet republics to the borders of Russia. The Treaty on European Union commits EU member states to rearmament and to a Common Security and Defence Policy that will 'contribute to the vitality of a renewed Atlantic Alliance'.

Since the 1997 Amsterdam Treaty, the EU has developed a military-political apparatus including the European Defence Agency, the EU Institute for Security Studies, the EU Satellite Centre and the European Operational Rapid Force (the nucleus of EU armed forces).

EU membership has not prevented members states from military intervention — mostly unlawful — in Djibouti, Chad, Mauritania, Afghanistan, Zaire, Iraq, Kuwait, Serbia, Bosnia, Kosovo, Somalia, Libya, Syria and elsewhere.

Q14. How important is Britain's trade with the EU?

Since joining the European Economic Community in 1973, the UK's trade deficit in goods with the EU has grown to £95bn (2017). Although there is a trade surplus in services (£28bn), the UK's overall trade balance with the EU is in deficit by £67bn.

Beyond the EU, the UK has a trade surplus with the rest of the world of £41bn (the £83bn surplus on services outweighing the £42bn goods deficit). The UK sells 44% of its exports to the EU (down from 53% in 1998) and is jointly the biggest market for EU exports along with the USA (16% each). The EU 28's share of world economic output has declined from 30% in 1980 to 17% today.

Britain and the EU have a mutual interest in maintaining close trade relations — but economic relations with the rest of the world are becoming increasingly important.

Q15. Would Brexit mean a loss of rights?

EU legislation has expanded some employment, environmental and consumer rights and standards. These were all transferred into British law by the EU (Withdrawal) Act 2018.

However, most of our rights and standards derive from domestic legislation — much of it won only after determined campaigning by trade unions, pressure groups and other popular movements. This is true in terms of statutory pay, pensions, health and social care, trade union recognition, the right to strike, most equalities legislation, planning and the environment.

UK rights and standards are often far superior to the minimum levels required by EU legislation (e.g. working time regulations, maternity pay, traffic pollution and animal welfare).

The Treaty on the Functioning of the European Union (TFEU) forbids any EU measures to enforce the right to strike, minimum pay or protection against employer lock-outs. The EU has never defended rights and freedoms in Britain against anti-trade union and other repressive legislation.

Instead, civil liberties in Britain have received some protection from the Council of Europe (established in 1949) to which all 47 European states are affiliated. Neither this nor its European Convention and Court of Human Rights (ECHR) are related to the EU.

In December 2014, in defence of its own powers, the EU Court of Justice ruled against European Union accession to the ECHR. In Britain, we will only lose our rights if we fail to defend them, whether outside or inside the EU.

Q16. Is Brexit racist?

The free movement of people within the EU has been accompanied by restrictions on people coming in from elsewhere. EU member states such as Britain, Denmark, Sweden and the Netherlands have been pressured to raise their barriers to non-EU immigration.

This 'Fortress Europe' policy has helped create the conditions in which violent racist attacks have increased in many EU Member States.

The trade and investment agreements imposed upon countries in Africa by the EU have opened up their economies to privatisation (e.g. water) and over-dependence on a narrow range of exports, contributing to debt, destitution and mass migration.

While many Leave voters in 2016 were concerned about immigration, opinion surveys (Ashcroft Polling, the TUC) show that their biggest issue was democratic control and national sovereignty. Misplaced fears about the impact of immigration on jobs and public services should be countered with information and rational argument, not by falsely branding 17.4m people as racists.

Q17. What's in Theresa May's EU deal?

The Withdrawal Agreement sets the terms of divorce:

- The UK formally leaves the EU and its institutions on 29th March 2019, but remains part of the EU Single Market in goods and most services and the Customs Union during the 'transition period' until 31st December 2020 (which can be extended for up to two years), bound by its rules and Directives (including any new ones). Thereafter, the UK will remain in a single market with the EU for trade in goods and many financial and other services, bound by current and future rules and Directives and ECJ rulings, but outside the EU Common Agricultural Policy.

- The UK and EU agree there should be a ‘frictionless’ border between the UK and Northern Ireland, on the one side, and the EU and Irish Republic on the other. Failure to reach an agreement on trade relations after December 2020 would mean that a ‘backstop’ would operate, whereby Northern Ireland stays aligned with EU Single Market and Customs Union rules and — for as long as the union exists — so, too, by extension would Britain. That arrangement can only be changed legally with EU consent.

- EU citizens and UK nationals and their family members will have guaranteed rights of continued residency and travel.

- The UK will pay an estimated £39bn to the EU in order to meet commitments to future EU expenditure. The EU claim is contested—a House of Lords report claimed that the UK owes nothing — and most of that money will not come to Britain or British citizens.

- Any disputes over interpretation of the Withdrawal Agreement will be decided according to ECJ rulings in matters of EU law, while British authorities will take ECJ rulings into account when deciding other matters.

- Both sides will continue to co-operate and co-ordinate their policies in areas such as taxation, professional qualifications, policing, judicial affairs, intellectual property rights and environmental protection.

The deal also comprises a much shorter Political Declaration about a framework for future UK-EU relations after the transition period.

Q18. What about Scotland and Wales?

Brexit would transfer decision-making powers in 64 areas of policy from the EU and its Commission to both the Scottish Parliament and the National Assembly of Wales. These areas include state aid to industry, public sector procurement, rail franchises, equalities legislation, agriculture, forestry, land use, carbon capture and storage, offshore oil and gas installations, environmental impact assessments and quality controls, planning consent, onshore hydrocarbon licences, radioactive shipments, animal welfare, food standards and public health and safety protection.

In 43 additional areas, Scotland’s greater degree of devolution would mean new powers over renewable energy, rail markets and operating licences, social security and criminal justice including child sexual exploitation and human trafficking.

There is every prospect that Scotland and Wales would develop policies that can only improve on the low standards set in Brussels and Westminster.

‘Independence’ for Scotland and Wales inside the EU would mean

(1) those powers remaining or going back to Brussels

(2) possible dislocation of trade relations with their biggest trading partner by far, namely, a post-Brexit England.

Q19. What are the 'Norway +' and 'Canada +' options?

As a member of EFTA, Norway participates alongside the EU in the European Economic Area, which is based on EU Single Market principles of the free movement of capital, labour, goods and services. EFTA also has its own less substantial free trade agreements with non-EU countries (mostly aligned with EU principles and standards).

Norway therefore accepts almost all EU legislation and ECJ and EU Commission rulings on economic matters (except agriculture and fisheries) and contributes to relevant EU budgets.

The EFTA countries are subject to EFTA Court rulings on market 'freedoms' and labour 'flexibility' and are part of the EU Schengen Area.

A 'Norway +' arrangement signifies adding affiliation to the EU Customs Union, Euratom, the European Defence Agency or the EU VAT Area to EEA membership.

EFTA member Switzerland participates in Euratom and — through its own non-EEA sectoral agreements — in the EU Single Market.

Under the EU-Canada Comprehensive Economic and Trade Agreement (CETA), trade tariffs on all industrial and most agricultural goods are being removed or capped. So are many barriers to investment, public procurement contracts and — with restrictions — the provision of services. EU Single Market rules do not apply, border checks on people and goods still operate and Canada will not contribute to EU funds.

State aid will be restricted and strict compensation rules apply in cases of nationalisation. Companies in the EU will be empowered to take the Canadian government to a disputes resolution tribunal.

Either side can withdraw from CETA with notice. For Britain, 'Canada +' could mean adding full access to each-others' financial markets.

Q20. What would happen if there's a 'no deal' Brexit?

Since triggering Article 50 in March 2017 giving belated notice to leave the EU, the British government and the EU have refused to negotiate a mutually beneficial agreement on withdrawal and future relations. Instead, the EU Commission has colluded with the pro-EU faction in the Tory Cabinet led by Theresa May and Chancellor Hammond to produce a 'bogus Brexit' deal, as the fall-back position if the Brexit decision could not be reversed altogether. Now we are told that we must back this 'bogus Brexit' or else the UK will 'crash out' of the EU on 29th March in a 'No Deal' Brexit, with 'catastrophic' results.

It's true that leaving the EU with no agreed replacement for current arrangements, or a transition period towards one, could cause significant upheaval and dislocation. for that, the Tory government and the EU would be jointly responsible. But forecasts of a catastrophe are wide of the mark.

Britain is the world's fifth biggest economic power. Most economic activity in Britain — around 80-85% — takes place independently of relations with the EU. Temporary and emergency arrangements could be negotiated, some in areas already covered by the Withdrawal Agreement, and economic relations can always be conducted in line with World Trade Organisation rules. These insist upon extensive market access between member countries and, except in very limited circumstances, forbid discrimination against any particular country. Tariffs on each other's products would be inconvenient — but Britain's trade deficit with the EU means that the Treasury could reimburse exporters in full from the tariffs on EU imports and still make a profit.

In the absence of the Withdrawal Agreement or an agreed alternative, UK-EU trade relations would be conducted under general WTO rules which:

(1) guarantee market access between WTO member states in most circumstances;

(2) disallow discrimination by one member state against another, unless a preferential trade agreement exists between them;

(3) set universal limits on tariff or quota levels that can be imposed on imports; and

(4) outlaw 'dumping' of under-priced exports on foreign markets.

Trading with the EU on WTO rules would free British governments to reduce tariffs with other countries and trading blocs which account for 55% (and rising) of Britain's trade.

Outside the EU, Britain would nevertheless remain a full participant in more than 70 international organisations including the UN and its affiliated bodies, the World Trade Organisation, the G8, the IMF, the International Labour Organisation, the International Panel on Climate Change, the Council of Europe, the European Court of Human Rights, Interpol and NATO.

Q21. Would a no-deal Brexit mean a 'hard border' in Ireland?

There has been a Common Travel Area across all of Britain and Ireland since 1952 (and 1923-39 before then). Customs posts between the UK/ Northern Ireland and the Irish Republic were dismantled in 1993, despite continuing different rates of VAT, excise duty and corporation tax and the need to maintain separate national economic accounts.

As confirmed by the all-party Home Affairs Committee of the European Parliament report *Hard Border 2.0* (September 2014), notification procedures, non-border spot checks and new technology make a structural 'hard border' across Ireland unnecessary, whether or not Britain and Ireland are in a European single market or customs union.

The EU Commission and its supporters in Ireland and Britain have raised the 'hard border' spectre to obstruct and discredit Brexit. Their 'backstop' clause in the Theresa May's UK-EU Withdrawal Agreement would lock Northern Ireland and Britain into the EU Single Market and Customs Union indefinitely, with no legal right of withdrawal, unless the EU agrees to a 'frictionless' free trade agreement during the transition period to December 2020.

Q22. Isn't a second referendum the democratic way forward?

The people were told that the June 2016 EU referendum would enable them to decide whether the UK — as a whole — would remain in or leave the EU. That exercise in popular sovereignty saw the biggest vote in Britain's history.

Nobody proposed beforehand that the result could or should be ignored as merely 'advisory'.

The official campaigns on both sides put forward reactionary and dishonest arguments and the Remain side (which included the Tory government, most big City banks, the CBI and the Institute of Directors) outspent the Leave side by £Xbn to £Ybn.

Normal democratic practice is that the results of a mass vote should be implemented before a similar vote occurs again. No conditions were attached to the size of the turnout or the majority needed for this to happen.

According to the detailed Ashcroft analysis, the majority of — by any definition — working class, unemployed, anti-capitalist, English, Welsh, Jewish and Sikh voters favoured Leave.

The 'People's Vote' campaign is promoted by the same big business forces and politicians that bankrolled and organised the official Remain campaign in the 2016 referendum.

Q23. Where does the Labour Party stand?

Labour's official policy is now to leave the EU and negotiate a trade and customs agreement that would retain all the alleged benefits of EU membership.

A majority of Labour MPs and many Shadow Cabinet members would prefer to remain in the EU or, failing that, to stay aligned with its Single Market and Customs Union — which could be done via membership of EFTA (the European Free Trade Association) and its European Economic Area with the EU. They argue that the EU could be reformed from within — but who by?

Most social-democratic parties in Europe have lost much of their support, having backed the EU and austerity policies for a decade and more. Labour currently opposes May's EU deal, claiming it jeopardises jobs, economic growth, future co-operation, etc.

While the Shadow Cabinet's official policy is to force the Tory government's resignation through Commons votes, leading to a General Election, many Labour MPs prefer one of the secondary options agreed at the 2018 party conference — a second referendum ('People's Vote') — in the hope that it will prevent or reverse Brexit.

Q24. What would be best for a future Labour government?

While taking full account of realities and a range of possible outcomes, the left cannot base its strategy on a perspective of permanent defeat and right-wing rule in Britain. In its 2017 General Election manifesto, Labour put forward a raft of policies that would conflict with the Treaty on the Functioning of the European Union, EU Directives and ECJ rulings as follows:

- A National Transformation Fund to boost infrastructure investment with extra government borrowing (v. the EU Stability & Growth Pact borrowing and debt limits and TFEU Article 123).

- A National Investment Bank and regional development banks to support small business, co-operatives, R&D and innovation (v. TFEU 107).

- Direction of corporate investment to distressed regions and nations (v TFEU 49, 50 and 63).

- Public ownership of rail services, energy, water and the Royal Mail, supporting public and social sector companies in competition with private ones (v. TFEU 18, 50, 56, 59, 106, 107 and Directives on the railways, public procurement and postal services and Fourth Railway Package).

- Maintenance of public and private sector banking facilities in local communities (v. TFEU 49, 50, 63, 106 and 107 and Directive protecting shareholders and creditors).

- Trade deals and duties which safeguard regulatory rights and public services, prevent dumping, subsidise exports and guarantee new jobs (v. TFEU 28-30, 32, 110, 113).

- Public procurement requirements for tax compliance, trade union recognition, equal opportunities and training provision (v. TFEU 37, 101 and Directives on public sector procurement).

- Make employees the 'buyer of first refusal' when their company is put up for sale (v. TFEU 49, 50, 56, 63 and Directives to protect shareholders and creditors).

- Amend company law so directors have a legal duty to workers, customers, the environment and the public interest as well as to shareholders (v. Directives to protect shareholders and creditors).

- End the exploitation of migrant labour and stop 'overseas-only recruitment practices' (v. 45, 46, Posted Workers Directives and ECJ rulings).

- Develop new, fair immigration rules once freedom of movement ends when Britain leaves the EU (otherwise v. TFEU 20, 21, 45, 46, 49).

- Restrict VAT to its current range of goods and services (v. VAT Directive and proposed VAT Action Plan)

These policies would almost certainly breach TFEU Articles 18 (against national discrimination), 20 and 21 (migration and residency rights), 28-30 (EU Customs Union, no internal but common external tariffs), 32 (EU Commission trade negotiating monopoly), 37 (regulating state monopoly procurement), 45 and 46 (free movement of workers), 49 and 50 (right of establishment), 56 (freedom to provide services), 59 (liberalisation of services), 63 (free movement of capital), 101 (banning supplementary public sector contract conditions), 106 (protecting competition against state monopolies), 107 (restricting state aid), 110 (banning tax discrimination against EU products), 113 (harmonisation of excise duties and turnover taxes) and 123 (banning central bank credit and bond purchases).

A left-led Labour government would face enough political and big business opposition from within and internationally, without becoming embroiled in an endless series of political and legal conflicts with EU treaties, rules and institutions.

Q25. Why a 'People's Brexit'?

A 'People's Brexit' would mean:

(1) Implementing the referendum result, not May's bogus Brexit or a second referendum.

(2) A General Election as soon as possible so a left-led Labour government can complete the withdrawal and negotiate new relations with the EU which protect jobs, public services and the welfare state.

(3) Britain no longer bound by EU treaties, rules, institutions and Directives so that British, Scottish, Welsh and local government would be free to implement left and progressive policies without EU obstruction.

(4) EU and British citizens retaining extensive rights of residency, work and travel across Europe, subject only to national policies required for just, balanced and sustainable development.

(5) Britain, the EU and its Member States continuing to cooperate closely across a wide range of economic, social, environmental and security matters, but with no British participation in the EU's military structures and programmes.

(6) Renegotiation of a financial settlement that substantially reduces the proposed divorce bill of approximately £39bn.

(7) A commitment from the British government to maintain all progressive spending programmes, employment rights and environmental and consumer standards carried over from EU membership.

Acknowledegements to the website: 21st Century Manifesto: ***for working class political power and revolutionary culture, news and analysis from Britain.***

THE TRUTH ABOUT THE SOVIET GULAG — SURPISINGLY REVEALED BY THE CIA

by Saed Teymuri

31st OCTOBER 2018

Introduction

'Humanitarian' lies serve to brainwash the population into supporting imperialist wars. Fed by far-right propaganda, and funded by the CIA, the mainstream 'news' outlets describe the Soviet labour camps — also known as 'Gulags' — as Stalin's means to repress pro-democracy dissidents and to enslave the Soviet masses. However, the same CIA that, through Operation Mockingbird, gave the US military almost-total control over mainstream press in order to foster anti-Soviet disinformation (Tracy 2018), has recently released declassified documents that invalidate the slanders surrounding the Gulags.

The CIA which conducted various anti-Soviet operations for almost five decades, and whose staff strived to obtain accurate intelligence about the USSR, cannot be said to have any bias in favour of the USSR. Therefore, the following declassified CIA files that surprisingly 'confess' in favour of the Soviet Union are particularly valuable.

While acknowledging the harsh conditions that existed in the Gulags — as with any prison system in the world — the goal of this article is to shed light on the following facts:

(1) the harshness of the prisons has been exaggerated by the Western press, with numerous lies being made up;

(2) the statistics in regards to the Gulag population have been exaggerated;

(3) there was a genuine effort at improving the prison conditions when given the chance'

(4) the prison standards were much higher than those of many capitalist countries.

The Conditions of the Prisons

A 1957 CIA document titled *Forced Labor Camps in the USSR: Transfer of Prisoners between Camps* reveals the following information about the Soviet Gulag in pages 2 to 6:

1. Until 1952, the prisoners were given a guaranteed amount food, plus extra food for over-fulfillment of quotas.

2. From 1952 onward, the Gulag system operated upon "economic accountability" such that the more the prisoners worked, the more they were paid.

3. For over-fulfilling the norms by 105%, one day of sentence was counted as two, thus reducing the time spent in the Gulag by one day.

4. Furthermore, because of the socialist reconstruction post-war, the Soviet government had more funds and so they increased prisoners' food supplies.

5. Until 1954, the prisoners worked 10 hours per day, whereas the free workers worked 8 hours per day. From 1954 onward, both prisoners and free workers worked 8 hours per day.

6. A CIA study of a sample camp showed that 95% of the prisoners were the mainstream criminals.

7. In 1953, amnesty was given to 70% of the "ordinary criminals" of a sample camp studied by the CIA. Within the next 3 months, most of them were re-arrested for committing new crimes.

The prededing are excerpts of the CIA document, underlined and put together for the reader:

These facts negate the narrative that Gulag prisoners were unpaid. The labour was indeed forced; however, material rewards were provided. The prisoners were paid from 1952 onward, and rewarded by food prior to 1952.

According to bourgeois fantasies, the Soviet 'regime' sought to deliberately starve the Gulag populations. However, as a matter of fact, there indeed were Soviet efforts to increase the food supply of prisoners, after World War II.

The fact that the working day was only two hours more than that of the free workers until 1954, and equal to that of the free worker from 1954 onward is a clear demonstration of the egalitarian tendencies of the Soviet State.

All the while, the noteworthy fact is that criminals, not "pro-democracy revolutionaries" were sent to the Gulags. Like all justice systems, there certainly were errors and some innocent people were sent to the prisons; the point though is that this fact has been exaggerated by the imperialist press.

Let's compare the Soviet system to that of the United States. The 13th Amendment permits prison slavery, with many prisoners victimized by racial profiling. Even the Clinton Dynasty had slaves in the Arkansas Province (News 2017).

The Numbers

According to page four of another CIA (1989) document titled *The Soviet Labour System: An Update*, the number of Gulag prisoners "grew to about 2 million" during Stalin's time.

These figures match Soviet statistics as well, from declassified Soviet achieves. The following is a 1954 declassified Soviet archival document (Pykhalov), an excerpt of which is translated into English:

"During the period from 1921 to the present time for counter-revolutionary crimes were convicted 3,777,380 people, including to capital punishment — 642,980 people to the camps and prisons for a period of 25 years old and under — 2,369,220 into exile and expulsion — 765,190 people.

"Of the total number of convicts, approximately convicted: 2,900,000 people — through the OGPU, NKVD and troikas and 877,000 people — by military tribunals, and Spetskollegiev Military Collegium.

"It should be noted… that established by Decree … on 3rd November 1934 Special Meeting of the NKVD which lasted until 1st September 1953 — 442,531 people were convicted, including to capital punishment — 10,101 people to prison — 360,921 people to exile and expulsion (within the country) — 57,539 people and other punishments (offset time in detention, deportation abroad, compulsory treatment) — 3,970 people…

Attorney General R. Rudenko
Interior Minister S. Kruglov
Justice Minister K. Gorshenin"

The Soviet archives remained declassified for decades, only to be released near or after the counter-revolution. In addition, after Stalin died, the Stalin-Era head of the NKVD (Soviet interior ministry) Lavrenty Beria had already been executed by Khrushchev, a staunch anti-Stalinist (History in an hour 2010). These facts make it very unlikely that the Soviet intelligence would have a pro-Stalin bias.

The Italian-American historian Michael Parenti (1997, pp. 79-80) further analyzes the data provided from the Soviet archives:

"In 1993, for the first time, several historians gained access to previously secret Soviet police archives and were able to establish well-documented estimates of prison and labor camp populations. They found that the total population of the entire gulag as of January 1939, near the end of the Great Purges, was 2,022,976. At about that time, there began a purge of the purgers, including many intelligence and secret police (NKVD) officials and members of the judiciary and other investigative committees, who were suddenly held responsible for the excesses of the terror despite their protestations of fidelity to the regime.

"Soviet labor camps were not death camps like those the Nazis built across Europe. There was no systematic extermination of inmates, no gas chambers or crematoria to dispose of millions of bodies…. [T]he great majority of gulag inmates survived and eventually returned to society when granted amnesty or when their terms were finished. In any given year, 20 to 40 percent of the inmates were released, according to archive records. Oblivious to these facts, the Moscow correspondent of the *New York Times* (7/31/96) continues to describe the gulag as 'the largest system of death camps in modern history'.

"Almost a million gulag prisoners were released during World War II to serve in the military. The archives reveal that more than half of all gulag deaths for the 1934-53 period occurred during the war years (1941-45), mostly from malnutrition, when severe privation was the common lot of the entire Soviet population. (Some 22 million Soviet citizens perished in the war.) In 1944, for instance, the labor-camp death rate was 92 per 1000. By 1953, with the postwar recovery, camp deaths had declined to 3 per 1000.

"Should all gulag inmates be considered innocent victims of Red repression?

"Contrary to what we have been led to believe, those arrested for political crimes ('counter-revolutionary offenses') numbered from 12 to 33 percent of the prison population, varying from year to year. The vast majority of inmates were charged with nonpolitical offenses: murder, assault, theft, banditry, smuggling, swindling, and other violations punishable in any society."

Thus, according to the CIA, approximately two million people were sent to the Gulag in the 1930s, whereas according to declassified Soviet archives, 2,369,220 up until 1954. When compared to the population of the USSR at the time, as well as the statistics of a country like the United States, the Gulag percent population in the USSR throughout its history was lower than that of the United States today or since the 1990s. In fact, based on Sousa's (1998)research, there was a larger percentage of prisoners (relative to the whole population) in the US, than there ever was in the USSR:

"In a rather small news item appearing in the newspapers of August 1997, the FLT-AP news agency reported that in the US there had never previously been so many people in the prison system as the 5.5 million held in 1996. This represents an increase of 200,000 people since 1995 and means that the number of criminals in the US equals 2.8% of the adult population. These data are available to all those who are part of the North American department of justice…. The number of convicts in the US today is 3 million higher than the maximum number ever held in the Soviet Union!

In the Soviet Union, there was a maximum of 2.4% of the adult population in prison for their crimes — in the US the figure is 2.8% and rising! According to a press release put out by the US department of justice on 18 January 1998, the number of convicts in the US in 1997 rose by 96,100."

Conclusion

Seeing the USSR as a major ideological challenge, the Western imperial bourgeoisie demonized Stalin and the Soviet Union. Yet after decades of propaganda, declassified archives from both the US and USSR together debunk these anti-Soviet slanders. Worth our attention is the fact that the CIA – a fiercely anti-Soviet source — has published declassified documents debunking the very anti-Soviet myths it promoted and continues to promote in the mainstream media. Together with declassified Soviet archives, the CIA files have demonstrated that the bourgeois press has lied about the Gulags.

Notes

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For Comrades wanting to read the original including source materials, please follow the link below:

https://stalinistkatyusha.wixsite.com/stalinist-katyusha/single-post/2018/10/04/The-Truth-about-theSoviet-Gulag---Surprisingly-Revealed-by-the-CIA?fbclid=IwAR2X_YbMmCUfTGDGsPImf_GONkBQbkJ2hjvRpbomuWaU85yNLJ5zErM9bkc

GULAG is an acronym for Glavnoe Upravlenie Lagerei, or Main Camp Administration.

IN SOLIDARITY

The Wiphala
Flag of the Indigenous People
Of Bolivia