



The Great Bird Flu Name Game

In an effort to secure bird flu samples, the World Health Organization proposes new nomenclature that absolves member countries of responsibility for outbreaks

By Robert G. Wallace, Ph.D.

THE WORLD HEALTH ORGANIZATION has proposed new nomenclature for the various strains of influenza A H5N1, the bird flu virus circulating in Eurasia and Africa.¹ The strains would now be enumerated rather than named after their countries or regions of origin.

WHO declares the change necessary because of the confusion caused by disparate naming systems presently used in the scientific literature. A unified system of nomenclature would facilitate the interpretation of genetic and surveillance data generated by different labs. It would also provide a framework for revising strain names based on viral characteristics. The new system would at the same time bring an end to the stigmatization caused when flu strains are named after their places of origin.

I am a public health phylogeographer. I use the genetic sequences of viruses and bacteria, including H5N1, to make discoveries about pathogen geographic spread and evolution. The proposed nomenclature has direct impact on the work I do.

On the one hand, the proposed changes seem reasonable enough. The new system would offer H5N1 taxonomy room to grow. For instance, the Qinghai-like strain of H5N1 that has spread west from Lake Qinghai in northwestern China across Eurasia and into Africa has undergone subsequent diversification.² The new groups must somehow be designated something beyond 'Qinghai-like.'

On the other hand, including geography in the strain names allows easier recognition than the open-ended enumeration WHO proposes. 'Fujian-like' is more readily identifiable than 'Clade 2.2.4.' Perhaps more fundamentally, as defined by variation in the virus's hemagglutinin and neuraminidase surface proteins, many H5N1 strains are geographically associated, either by their current distribution or place of origin. Clade 2.1 is currently limited to Indonesia. Clade 2.2, the Qinghai-like strain, spread west from Lake Qinghai (although the strain has since been traced a step back to Lake Poyang in Jiangxi).³

On its face, this appears a technical problem, one for the

scientists and bureaucrats to hash out. But there may be more at stake. The proposed changes represent an epidemiological approach that may threaten our ability to impute bird flu's causes, to implement appropriate interventions, and to name the names of those responsible for controlling local outbreaks.

If a strain of bird flu appears to newly emerge out of a specific province or state of an affected country, that country is responsible for intervening in such a way that the outbreak and any sequelae are controlled. Labeling a strain by its probable locale of origin reminds us which countries are responsible and to where attention must be directed. Even if the strains subsequently spread, their geographic origins are integral to learning more about the virus's molecular and epidemiological characteristics, as well as preventing the emergence of similar strains.

Cause and blame, then, appear to be the crux of the matter. The terminology WHO characterizes as "stigmatizing" may be viewed instead as solely definitional, a part of pinpointing causality.

Unfortunately, on first appraisal WHO's stance has history in its favor. Epidemiological nomenclature has long been a minefield. Diseases have been tagged with baseless labels often inspired by xenophobia. The French disease. Spanish influenza. Illnesses imputed to the 'Yellow Peril.' All wrongly affixed or associated. Here, though, WHO's explanation seems a stretch. 'Bird flu' has no geographic tag and the origins of those strains that do are established by scientific investigation rather than knee-jerk bigotry.

WHO's terminological umbrella also seems overly protective. Should national governments whose policies contribute to the rise of a disease be treated as if they are defenseless minorities discriminated against because of an ill-conceived notion of disease etiology? Should health and agricultural ministries be regarded as if they have been targeted with the groundless prejudice Haitians suffered in the early days of the AIDS epidemic?

Something more than sensitivity on WHO's part to past injustices seems in play. An exploration of the recent political economy of bird flu research will show the proposed

nomenclature part of an effort by WHO to placate member countries that are currently apparent sources for many of the new bird flu strains. Without these members' cooperation, WHO would have no or little access to H5N1 isolates from which genetic sequences and possible vaccines can be derived.

We need ask, however, at what price such appeasement comes. Do we lose the very means by which to maneuver recalcitrant countries into intervening into local epidemics that may threaten the welfare of the rest of the world?

The proposed nomenclature seems emblematic of larger efforts on the part of WHO and many of the world's governments to stage-manage an influenza pandemic. For the conspiracy nuts out there that isn't to say WHO or any lab or agency of any government started bird flu. Influenza viruses have long circulated among migratory birds and within the last few hundred years have become adapted to humanity's industrial way of life.⁴ Nor is WHO out-and-out negligent. I believe WHO genuinely focused on fighting bird flu.

Still, like many institutions, WHO is maneuvering to protect itself. The bird flu train may have already left the epidemiological station and a pandemic may now be all but inevitable. In what would be a catastrophic failure on the part of governments and health ministries worldwide, millions may die.

Who, then, if not the affected countries, will take the blame? International institutions entrusted with preventing catastrophe are often made scapegoats for their members' failures. World War II destroyed the League of Nations. A pandemic could do the same to WHO. The new nomenclature may represent one means by which the organization is attempting to extricate itself out of the political line of fire.

Adverse Reactions

In late 2006 virologist Guan Yi and his colleagues at the University of Hong Kong reported on a previously uncharacterized H5N1 lineage they named 'Fujian-like,' after the putative Chinese province of origin.⁵ They ascribed the emergence of the strain as a viral evolutionary reaction to the government's campaign to vaccinate poultry. The virus appeared to evolve out from underneath the vaccine coverage.

Chinese officials went ballistic, rejecting the findings.

"The data cited in the article was unauthentic, and the research methodology was not based on science," Jia Youling, China's chief veterinary officer, told a news conference.⁶

"In fact, there is no such thing as a new 'Fujian-like' virus variant at all," said Jia.

The University of Hong Kong report appeared to deeply embarrass the Chinese government. As WHO officials pointed out, if the government, which has a parallel surveillance effort, didn't know of the emergent strain the new strain would in some minds betray governmental incompetence. If officials did know of the Fujian-like strain, their refusal to inform the international community would imply a cover-up along the lines of SARS.^{7,8}

Even without maps of local H5N1 spread the Chinese



University of Hong Kong virologist Guan Yi

surely recognized their southern provinces were ground zero for the first, and many subsequent, H5N1 outbreaks.

On the other hand, we should appreciate that bird flu is a difficult problem and would be for any national government. Imagine rolling outbreaks across 26 U.S. states—Hurricane Katrina writ large. Would CDC, USDA and Fish and Wildlife, currently staffed with unqualified Bush political appointees, be capable of reacting any differently to such a viral onslaught? I do not excuse the Chinese government, but offer the acknowledgement as a preemptive response to what will likely be attempts to paint bird flu as another case of Chinese exceptionalism. Governments worldwide are unprepared.

The pressure on Chinese health officials must be enormous and a tone of hysteria is hard to miss. But even as we recognize the source of the government's reaction, must we accept the claims imparted in its manifestation?

"It is utterly groundless to assert that the outbreak of bird flu in Southeast Asian countries was caused by avian influenza in China and there would be a new outbreak wave in the world," said Jia. Not true.

"Since 2004, China has been keeping a close eye on the bird flu situation in its southern regions," said Foreign Ministry spokesman Liu Jianchao.⁹ "Gene sequence analysis shows that all the variants of the virus found in southern China share high uniformity, meaning they all belong to the same gene type." Also not true.

"No distinctive change was found in their biological characteristics," Liu continued. Again not true.

In March this year, with colleagues at the University of California I published a report that identified the geographic source of multiple strains of highly pathogenic influenza A H5N1.¹⁰ Our analysis of H5N1 genetic sequences collected through 2005 across 20 Eurasian localities showed Guangdong, another southeastern province, the likely source of H5N1 strains spreading regionally within China and in other countries, including Indonesia, Japan, Thailand and Vietnam.

While our paper did not address the Fujian-like variant, the results refuted the assertion China had nothing to do with repeated regional and international outbreaks of H5N1. It is clear that multiple strains have evolved in and dispersed from southern China and, as other work shows, continue to do so. Indeed, scientists from Guangdong's own South China Agricultural University contributed to a 2005 report showing that a new H5N1 genotype arose in western Guangdong in 2003-4.¹¹

Official reaction to our work was nearly identical in its virulence to that of the Hong Kong scientists. Yu Yedong, head of the Guangdong Animal Epidemic Prevention Institute and the Guangdong Bird Flu Prevention Center called our work “unscientific” and “ridiculous.”¹²

He Xia, a spokesperson for the Guangdong Provincial Agricultural Department, told *China Daily* the study was flawed and lacked credibility.¹³ “Actually, Guangdong did not witness any bird flu cases in 1996. As a result, the findings are not based on facts,” He said.

He’s statements are curious given samples of highly pathogenic H5N1 were isolated by Chinese scientists from a 1996 outbreak on a goose farm in Guangdong.¹⁴⁻¹⁶ News reports during the initial H5N1 outbreak in Hong Kong in 1997 also detailed local health officials’ decision to ban poultry imports from Guangdong from where several batches of infected chickens originated.¹⁸

Multilateral Manipulation

The Chinese government isn’t the sole source of official denials and delay.

Indonesia’s Health Minister Siti Fadilah Supari claimed findings by a University of Washington team showing a cluster of infections among members of a Sumatran family were spread by human-to-human infection had “misled the public.”¹⁹

“It’s pure logic... If there had been human-to-human transmission, it would have already swept the country and killed thousands,” Supari told a news conference.²⁰ Evidence of human-to-human infection, however, does not require an ensuing pandemic. Chains of transmission may burn out by chance alone.

Supari serves at WHO as well. She was elected a Vice-President of the World Health Assembly in 2006 and this year unanimously elected a member of the WHO executive

board. The executive board has its share of problems, particularly its nettle of competing interests.²¹ But one can imagine the impact on the morale of WHO scientists when a member of the organization’s leadership rejects scientific findings in favor of nationalist expediency.

Indeed, WHO staff have openly criticized Supari. On another matter—Indonesia’s refusal to share H5N1 samples—David Heymann, WHO’s assistant director-general for communicable diseases, said of Supari that “she has always said she doesn’t trust WHO, and she’s finding new reasons not to trust us.”²² Although WHO may have helped bring that distrust about on its own.

The sublimation of scientific practice by political directives cannot be laid at China’s or Indonesia’s feet alone. Perverting science for political gain is itself in a pandemic

phase. Here in the United States, apparatchiks in the Bush administration have revised the content of myriad scientific reports—the bedrock of reality upon which governmental action need take place—for political points. Climate change, deforestation, pollution, stem cells, AIDS and condoms, evolution, the Surgeon General’s office, and the Centers for Disease Control and Prevention have all been misrepresented or interfered with by Bush appointees, many scions of corporate lobbies or the religious right.²³⁻²⁷

Although President Bush has paid greater attention to the possibility of an influenza pandemic than, say, to Katrina and its aftermath—reading John Barry’s book about the 1918 pandemic will do that to you²⁸—the U.S. has also pursued an agenda that protects pharmaceutical multinationals at the expense of global health.

The latest maneuver involves blocking efforts to reform the world’s influenza vaccine system. Under the Global Influenza Surveillance Network (GISN), countries have for the past 55 years annually forwarded samples of prevalent influenza strains to the World Health Organization.²⁹ WHO offers the samples at no cost to pharmaceutical companies willing to make vaccines. The companies subsequently sell the vaccines at profit. The vaccines are thereby made available only to those populations able to afford them, namely people living in highly industrialized countries.

Indonesia has now refused to forward its H5N1 samples in an effort to force changes in the system, to make vaccines available to its own people. Indonesia, a primary epicenter for H5N1 outbreaks, has suffered considerable condemnation for its decision, including, as Heymann’s comment makes clear, from WHO itself. Indonesia, in essence, is holding global health hostage, by refusing scientists around the world access to local samples of bird flu.

As immediately frustrating as the refusal is to scientists, phylogeographers included, Indonesia’s protest is a just one in principle. People who cannot afford the latest medicine deserve to be protected from deadly diseases. Detractors have argued back that time is a-wastin’ and an outbreak that begins undeterred in Indonesia helps no one, including, or especially, the poor there. But I think the impasse can be quickly resolved once international aid is provided for vaccine factories in poorer countries.

The problem is, of course, such a solution would undermine profit-driven medicine, a violation of the neo-liberal globalization idealized by WHO’s wealthiest supporters. At a recent international conference convened in Geneva to resolve the impasse, the U.S. and the E.U. stonewalled efforts to reform GISN. As reported by Ed Hammond on the ‘Effect Measure’ blog, the interference included an attempt to insert language from the World Health Assembly’s International Health Regulations that would have forced countries to transfer disease samples to WHO (even as the U.S. has cited national sovereignty in refusing to return Indonesian influenza samples back to Indonesia).^{30,31}

The impasse could still very well be resolved—let’s hope so for all our sakes—but the role of U.S. intransigence in the matter, unlike Indonesia’s, has been underreported.



Siti Fadilah Supari

Earlier Warnings

The attacks upon our work on the phylogeography of bird flu arrived via provincial governmental officials in China, even before the paper was available. Beijing, on the other hand, remained curiously silent.

Perhaps the accumulating work showing southern China's role in H5N1 spread gave the central government pause. Perhaps Beijing would have the good taste to criticize the work only after it was published. Perhaps the government learned from the SARS episode, during which it erroneously harangued foreign scientists that no danger existed. Or perhaps officials discovered Walter Fitch, head of the team that produced our report, gave a presentation on the methods used in the study to an audience that included members of the Chinese Academy of Sciences in Shanghai in December 2005. The work wasn't completely out of left field.

Officials may have also recognized a broader denunciation might attract greater attention to China's long history with influenza. A variety of subtypes have been discovered emanating from southern China, Guangdong included, for decades.³²⁻³⁵ In the early 1980s, University of Hong Kong microbiologist Kennedy Shortridge identified 46 of the 108 different possible combinations of hemagglutinin and neuraminidase subtypes circulating worldwide at that time in a single Hong Kong poultry factory.³⁶

In WHO's own bulletin, Shortridge, writing in 1982, detailed the likely reasons southern China would serve as ground zero for the next influenza pandemic:

- Southern China hosts mass production of ducks on innumerable ponds, facilitating fecal-oral transmission of multiple influenza subtypes.
- The greater mix of influenza serotypes in southern China increases the possibility the correct combination of gene segments would arise by genetic reassortment, selecting for a newly emergent human strain.
- Influenza circulates year-round there, surviving the interepidemic period by transmitting by the fecal-oral mode of infection.
- The proximity of human habitation in southern China provides an ideal interface across which a human-specific strain may emerge.

The conditions Shortridge outlined have since only intensified with China's liberalizing economy. Millions of people have moved into Guangdong the past decade, a part of one of the greatest migration events in human history, from rural China into cities of the coastal provinces.³⁷ Concomitant changes in agricultural technology and ownership structure have put hundreds of millions more poultry into production.³⁸⁻⁴⁰ Duck meat in China, for instance, tripled through the 1990s.

In 1995, two years before the first H5N1 outbreak in Hong Kong, Shortridge, in close contact with mainland colleagues, again warned that the next pandemic strain would arise in southern China.⁴¹ "Every effort should be made to improve diagnostic capabilities in China and lines of communication to provincial and municipal health and epidemic prevention centres and then to the National Influenza Centre, Beijing,"

Shortridge advised.

China is a country of a billion people and it would be absurd to expect anything other than a variety of responses to the research. Dismissal has hardly been the sole reaction.

In April 1982, Shortridge and colleagues convened a meeting of Hong Kong and Chinese virologists and animal health officials to discuss the possible emergence of a human-specific infection from influenzas circulating in the region.³³ Attendees included Yuanji Guo of the Chinese Academy of Medical Sciences' Institute of Virology, F. A. Liu and S. C. Au from South China Agricultural College's Department of Animal Husbandry and Veterinary Medicine, situated in Guangzhou, the capital of Guangdong, and G. Z. Shen of the Health and Anti-Epidemic Station in Guangzhou. Good faith efforts at scientific collaboration have long been practiced.



Kennedy Shortridge

I received email from scientists from institutions across China after our paper on the phylogeography of bird flu was published this year. The emails were filled with fascinating insights, questions about methodology, and serious-minded critique. One scientist from the China Animal Health and Epidemiology Center in Qingdao asked about sampling and estimate errors in our analysis and raised the issue whether Hong Kong and Guangdong should be clustered into a single epidemiological unit.

In short, many Chinese scientists have been—and continue to be—addressing bird flu in a dedicated and serious manner. Indeed, a fair amount of the work cited here has been conducted by mainland Chinese. Their efforts to discover the nature of what is occurring in their own country, and elsewhere, should be applauded. That's different, though, from offering the Chinese government *prima facie* exculpation for the responsibilities it holds in allowing conditions that have led to a gathering epidemiological disaster.

Blame Is a Good Thing

The scuffle over the Fujian-like strain seemed part and parcel of an ongoing dispute between the Chinese government and Guan Yi, the Hong Kong-based scientist and leader of the team that produced the report on the new viral variant.

In 2003, when SARS first emerged in Guangdong, Guan smuggled out samples from patients suffering the mysterious new pneumonia.⁷ Guan took the samples out from underneath an embargo imposed by Beijing when few samples were available for analysis anywhere. Guan has since repeatedly called out the government on its inaction on bird flu.^{42,43} In 2005, the government threatened to close down Guan's Shantou lab in retaliation.

The dispute appears conjoined with chief vet Jia Youling's

objections to a case of stolen credit. In early 2006, Jia complained Western scientists claimed sole authorship on a paper that included samples provided by Chinese government scientists.⁴⁴

In an effort to maintain access to a flow of Chinese H5N1 samples, the World Health Organization apologized for the fleeced credit. But in a clear case of appeasement little related to the original offence, China also won WHO's admonition that no bird flu strain should be identified with any

single area, sixteen months before the proposed revisions in H5N1 nomenclature.

"It's very important that naming of viruses is done in a way that doesn't stigmatize countries, that doesn't stigmatize regions



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China's chief vet Jia Youling

and doesn't stigmatize individual people," said David Heymann, WHO's assistant director-general for communicable diseases. Perhaps abject cynicism is unwarranted. Heymann, after all, had expressed similar sentiments during the SARS outbreak.⁷ The horse-trading here, though, is obvious.

Another tack is to admit the geographic origins but to shift attention to more present events. In response to our work showing southern China a source of multiple H5N1 strains, WHO spokesman Gregory Hartl observed that the mainland origins were already known and that "what is most important for us and anyone who works in the field of surveillance and trying to contain and combat H5N1...is knowing where the virus is now, what it is doing and which strains are circulating more widely."¹¹

Never mind that strains of H5N1 continue to emerge from southern China. Never mind that bird flu's present course is inextricably interwoven with its origins—the virus's history matters. H5N1's origins provide us more than an epidemiological context. There are fundamentally pragmatic matters involved in identifying strain sources, including discovering the mechanisms of influenza's spread and evolution.

Never mind too that the call for a more forgiving nomenclature hasn't kept the Chinese government from placing blame upon other countries. *Beijing News* quoted Vice Agriculture Minister Yin Chengjie to the effect that China needed to strengthen its monitoring and response systems nationwide because of recent outbreaks in "surrounding countries," an apparent reference to Vietnam and other parts of Indochina.⁴⁵

"The disease has continued to spread in neighboring countries. This poses a big danger to our prevention and control work," said Yin. That's absolutely correct. But what is good for the sick goose is good for the sick gander. China cannot extract a free pass from bird flu blame while placing the same upon its neighbors.

Vietnam, in turn, has since reported the Fujian-like strain has shown up in several of its provinces north and south. In describing the outbreaks Vietnamese officials tellingly used the F-word, as Crawford Kilian of the 'H5N1' blog has

coined it.

All in all, though, WHO does have a point. Since at least 1580 influenza outbreaks sweeping across Eurasia have been ascribed to—and named after—foreign lands, often on the basis of precarious evidence.^{4,46} Influenza names have been as much signifiers of scapegoat xenophobia as for any other disease, including, infamously, STDs. The 'Spanish' influenza of 1918 did not first emerge in Spain but was instead first reported on there by one of Europe's few free presses allowed to operate uncensored during WWI. WHO, then, isn't incorrect in its efforts to 'destigmatize' bird flu strains, if only by way of its good intentions.

History shows the Chinese have particular cause for concern. The Third Plague Pandemic began in the Yunnan province in 1855 before infecting millions worldwide over the next 100 years. The disease was essentialized by Sino-phobes as a marker of the country's people and a reason for turning back the migration of the 'Yellow Peril.' Racist grotesqueries deployed for nativist gain.

The awful irony, however, is that this will be the very first influenza pandemic scientists *will* be able to pinpoint a locality of origin, even, if sampling continues to improve, to the very farm of origin or by Global Positioning Systems coordinate.^{10,47} And that is likely a reason the Chinese government and those of other affected countries support or pushed for the new nomenclature. Scientific investigation may show one or more of these governments culpable for any human pandemic that emerges.

Locality has meaning beyond where the pathogen happened to originate. Local conditions imposed by public policy and social practice shape viral evolution. Other crises and conditions, in contrast, are less freighted with such immediate causality. Sweden, for instance, hasn't registered protest with the U.N. over 'Stockholm Syndrome,' nor Germany over the Marburg virus.

That all said, the origins of highly pathogenic H5N1 *are* multifactorial, with many countries and industries at fault. Can we then place blame on the country, say, Indonesia or Vietnam or Nigeria, from which a human-to-human pandemic might first emerge? Should we blame China for repeatedly seeding outbreaks regionally and internationally? Or should we blame the United States, where the industrial model of vertically integrated poultry first originated, with thousands of birds packed in as so much food for flu?⁴⁸ The answers are yes, yes, and yes.

Blame, much as the problem itself, must be distributed about its multiple levels of social and ecological organization, and, yes, localities. Attempts at placating member countries with politically correct taxonomy may otherwise dissipate honest efforts to identify the epidemic's causes. Each source—country, region, people, to use Heymann's list—must suck up its responsibility and, most importantly, turn fault into serious concerted and broad-based action.

In the short term, small farmers must be fairly compensated for poultry culled in an effort to control outbreaks. Poultry trade must be better regulated at international borders.^{49,50} The world's poor must be provided epidemiological

assistance, as well as vaccine and antiviral at no cost.⁵¹⁻⁵³ Structural adjustment programs degrading animal health infrastructure in the poorest countries must be terminated.⁵⁴

For the long term, we must end the poultry industry as we know it. Bird flu now emerges by way of a globalized network of corporate poultry production and trade, wherever specific strains first evolve. We must devolve much of the production to smaller, locally owned farms.⁵⁵ Genetic monocultures of domesticated bird must be diversified back into heirloom varieties, as immunological firebreaks. Migratory birds, which serve as a fount of influenza strains, must be weaned off agricultural land where they cross-infect poultry.^{56,57} To do so, wetlands worldwide, wildfowl's natural habitat, must be restored.

Global public health capacity must also be rebuilt.⁵⁸ That capacity is only the most immediate remediation for the poverty, malnutrition, and other manifestations of structural violence that promote the emergence and mortality of infectious diseases, including influenza.⁵⁹ Pandemic and inter-pandemic flu have the greatest impact on the poorest.⁶⁰ And, as for any infection, a threat to one is a threat to all.

Only once these objectives are fulfilled will we be able to cover ourselves against H5N1 and the other influenza serotypes—H5N2, H6N1, H7N2, H7N7, H9N2—now lining up across factory farms like tropical depressions in the ocean.

No Generic Labels

Along with the broad plan we've outlined, the nature of the World Health Organization's interactions with China must change.

During the SARS epidemic the Chinese government played WHO for fools. The government took extraordinary measures in blocking WHO scientists from visiting Guangdong, the original source of the outbreak.⁷ In a jaw-dropping escapade, WHO scientists were sent on a goose chase around Beijing. For weeks the Chinese health ministry had denied Beijing suffered any more than a few SARS cases. As WHO scientists visited local hospitals, the Beijing municipal health service off-loaded dozens of deadly-sick SARS patients into ambulances that drove about the city until WHO representatives left each hospital.

Once exposed, the health minister was fired and Hu Jianto, China's new leader, sent the Chinese government on an about-face. The government made SARS a key priority and imposed a virtual lockdown on affected areas.

The ability of the Chinese government to impose such drastic public health measures might be taken as the unfortunate upside of a dictatorship. Except, of course, China's treatment of public health data as state secrets helped bring about the crisis in the first place. Doctors in newly infected provinces were long kept in the dark as to the nature of the mysterious pathogen, delaying appropriate treatment and spreading SARS to its next town.

Since SARS, WHO has apparently arrived at a better, though still tenuous, working relationship with the Chinese government.⁶¹ Greater access to samples and sites appears the norm for a number of pathogens. That's good. But if

WHO'S SECRET DATABASE

IN FEBRUARY 2006, Ilaria Capua, head of the Virology Department at the Istituto Zooprofilattico Sperimentale delle Venezie, blew the whistle on the World Health Organization.⁶²

Capua had recently sequenced the first samples of the highly pathogenic H5N1 virus from Nigeria. She was approached by several people from a WHO network of some 15 labs worldwide and asked if she would deposit the new genetic sequences in a limited-access database.^{63,64} In return she would receive the password for, and access to, the database.

Capua refused to play ball. She declined the offer, instead depositing the sequences in GenBank, a publicly accessible database. She organized a campaign to encourage colleagues from around the world to publicly deposit their H5N1 sequences. And she helped found the Global Initiative on Sharing Avian Influenza Data, a new effort at fostering international sharing of bird flu isolates and data.⁶⁵

WHO argued that some countries are reluctant to submit samples without some form of confidentiality.⁶²



Ilaria Capua

The rationale falters on several accounts. The governments of countries hit by bird flu fear that the sequences would reveal failures in governmental efforts to control the spread and evolution of circulating strains and viral drug resistance. Efforts to conceal those failures should be neither abetted nor encouraged.

The fair distribution of scientific credit for isolating and analyzing indigent H5N1 samples, a second reason for confidentiality, must, of course, be addressed. Scientists working in affected countries often struggle to conduct their research in the face of financial and political indifference or even repression. Giving credit where credit is due will help assure their essential research programs are continued and, better yet, funded. But the issue of attribution remains a concern whether or not the sequences are warehoused away. Data that can provide insight about a gathering pandemic should not be held hostage. Shaming those who snatch credit will be punishment enough.

Finally, with all due respect, it is highly unlikely that the 15 labs with keys to the database are willing or able to conduct all the necessary research on new sequences. The H5N1 phylogeographies we constructed at UC Irvine were based on publicly available sequences.¹⁰ One wonders what else could have been learned with the



JEAN CHUNG

Jones Ginting, the sole survivor of the Sumatran cluster

shelved data.

Other researchers have expressed similar sentiments. “Flu researchers don’t all look at the data from the same angle. The more diverse analyses that are performed, the better we will understand the evolution of this virus,” University of Pittsburgh genome scientist Elodie Ghedin told *Nature*.⁶⁶

During the SARS crisis, the WHO network of labs played an integral role in identifying the coronavirus that causes the disease. The secured communication across labs permitted unprecedented collaboration—sharing microscopy pictures, experimental protocols, phylogenies, and primer genetic sequences.⁷ The scale of potential collaboration now outstrips the network’s capacity. With many more scientists working on bird flu the network turns research into something of an exclusive affair. To their great credit, several of the labs have since released numerous H5N1 sequences, although access to sequence data—governmental and private—remains a problem worldwide.⁶⁷

With research on the latest available sequences constrained to 15 sanctioned labs, WHO may have been better able to control, if not the results of the research, the timing of their release and their initial interpretation.

One example. In May 2006, WHO released a statement on the Sumatran family of eight infected by H5N1, the longest chain of human-to-human infections documented so far.⁶⁶ The statement declared that there was “no evidence of genetic reassortment with human or pig influenza viruses and no evidence of significant mutations.”

But as *Nature*’s Declan Butler points out, WHO did not report data showing that the virus underwent rapid evolution as it spread through the family. Indeed, the H5N1 with which the father of the family was infected expressed twenty-one nucleotide mutations across eight genes in comparison with the virus hosted by his son, his likely source of infection.

We are all the worse for such stage-managed science.

-RGW

there is one thing I have learned in the reaction to our research report, that cooperation comes at a price.

WHO willfully participates in China’s propaganda efforts to minimize, even deny, the government’s responsibilities for the outbreaks. Time and again, even as Chinese officials drag their feet releasing samples, WHO officials are called upon to deflect external criticism and praise China’s epidemiological openness (sunshine other countries must uphold as standard international practice). It is a self-brinksmanship that nearly blew up in WHO’s face during the SARS outbreak.

WHO may view running over the work of a few independent scientists as an appropriate price. China’s government, after all, is one of the organization’s principal clients and access to samples is imperative. What happens, though, when the interests of governments come into conflict with the health of the people of the world? How does coddling China’s government protect my wife, my barber, the Shanghai medical student who emailed me, Peter and Kate and their son Julian, Felipe Pichardo, Auntie Adrienne? When and where are their interests represented? Diplomat-scientists often confuse the great game with how the world works. Certainly negotiations among countries and institutions are a part of the world, but they are not its be-all end-all. An evolving H5N1 threatens millions of people along the way. They count.

WHO officials might respond that in coaxing enough cooperation out of China we can stop the next pandemic and save your family and friends. But with H5N1 now percolating across Eurasia and Africa, that strategy should be considered a failure. WHO’s ill-qualified cooperation may instead give cover to agricultural and public health practices that have placed the world on the precipice of its next pandemic.

WHO needs to stop running interference for China’s government (and for the U.S., for that matter). If nothing else, WHO should avoid placing Chinese-brand strains of bird flu under generic labels. ‘Qinghai-like,’ ‘Fujian-like,’ such names should remain intact, if anything as reminders bird flu has specific origins. The best way the Chinese or any other government can avoid the sting of nomenclature is to devise and enact means by which to keep the next strains from emerging in the first place. There would be then no virus to name.

China could reasonably argue that a finer taxonomy is preferable. Once the factories that have served up the latest virulent outbreaks have been identified, new strains can be rebranded after their corporate sources: the Bernard Matthews strain, the Charoen Pokphand virus, the Tyson cluster.

By either nomenclature, reputations will be tarnished, yes, not by bigotry or unfairness, but by the infamy governments and companies have brought upon themselves in placing many millions of people in danger.



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Notes

1. WHO. Towards a unified nomenclature system for the highly pathogenic H5N1 avian influenza viruses. Released Aug 7, 2007. http://www.who.int/csr/disease/avian_influenza/guidelines/nomenclature/en/index.html.
2. S. L. Salzberg, C. Kingsford, G. Cattoli, D. J. Spiro, D. A. Janies, *et al.* Genome analysis linking recent European and African influenza (H5N1) viruses. *Emerg Infect Dis.* 13, 713 (2007).
3. H. Chen, G. J. D. Smith, J. S. Li, J. Wang, X. H. Fan, *et al.* Establishment of multiple sublineages of H5N1 influenza virus in Asia: implications for pandemic control. *Proc Natl Acad Sci U S A* 103, 2845 (2006).
4. K. D. Patterson. *Pandemic Influenza, 1700-1900: A Study in Historical Epidemiology.* (Rowman & Littlefield Publishers, Totowa, NJ, 1986).
5. G. J. D. Smith, X. H. Fan, J. Wang, K. S. Li, K. Qin, J. X. Zhang, *et al.* Emergence and pre-dominance of an H5N1 influenza variant in China. *Proc Natl Acad Sci U S A* 103, 16936 (2006).
6. Reuters. China shares bird flu samples, denies new strain report. November 10, 2006. <http://www.alertnet.org/thenews/newsdesk/PEK2663.htm>
7. K. T. Greenfeld. *China Syndrome: The True Story of the 21st Century's First Great Epidemic.* (Harper Perennial, 2007).
8. In 2003 the Chinese government took months to inform the world of SARS, a deadly respiratory coronavirus that originated in the southeastern province of Guangdong before infecting 8000 people across several countries worldwide.
9. Ministries refute bird flu virus rumour in China. *China Daily.* November 3, 2006. http://english.peopledaily.com.cn/200611/03/eng20061103_317874.html
10. R. G. Wallace, H. HoDac, R. H. Lathrop, W. M. Fitch. A statistical phylogeography of influenza A H5N1. *Proc Natl Acad Sci U S A* 104, 4473 (2007).
11. X.-F. Wan, T. Ren, K.-J. Luo, M. Liao, G.-H. Zhang, *et al.* Genetic characterization of H5N1 avian influenza viruses isolated in southern China during the 2003-04 avian influenza outbreaks. *Archives of Virology* 150, 1257 (2005).
12. K. Huang, M.A. Benitez. Guangdong ridicules H5N1 claims. *South China Morning Post.* March 7, 2007.
13. CIDRAP News. H5N1 death in Laos confirmed; Chinese reject research report. March 8, 2007. <http://www.cidrap.umn.edu/cidrap/cotent/influenza/avianflu/news/mar0807avian.html>.
14. X. Tang, G. Tian, J. Zhao, K. Y. Zhou. Isolation and characterization of prevalent strains of avian influenza viruses in China. *Chin. J. Anim. Poult. Infect. Dis.* 20, 1 (1998) (In Chinese).
15. In 1999, the 1996 genotype was again isolated in Hong Kong in a shipment of geese from Guangdong.
16. Mainland scientists recently hypothesized the 1996 Guangdong genotype arose from a recombination of H3 and H7 strains isolated in nearby Nanchang and a Japanese H5 virus.¹⁷ Low pathogenic H5 strains circulate worldwide, including a recent outbreak in Pennsylvania.
17. M. M. Mukhtar, S. T. Rasool, D. Song, C. Zhu, Q. Hao, *et al.* Origins of highly pathogenic H5N1 avian influenza virus in China and genetic characterization of donor and recipient viruses. *Journal of General Virology* 88, 3094 (2007).
18. N. Kang-Chung. Chicken imports slashed by third. *South China Morning Post.* December 15, 1997.
19. Y. Yang, M. E. Halloran, J. D. Sugimoto, I. M. Longini, Jr. Detecting human-to-human transmission of avian influenza A (H5N1). *Emerg Infect Dis.* 13, 1348 (2007).
20. Reuters. Indonesia dismisses human-to-human bird flu report. September 3, 2007. <http://www.reuters.com/article/healthNews/idUSPAR36484220070903>.
21. R. Horton. WHO: strengthening the road to renewal. *Lancet* 367, 1793.
22. M. Enerink, D. Normille. More bumps on the road to global sharing of H5N1 samples. *Science* 318, 1229 (2007).
23. S. Shulman. *Undermining Science: Suppression and Distortion in the Bush Administration* (University of California Press. Berkeley, CA, 2006).
24. C. Mooney. *The Republican War on Science* (Basic Books, 2005).
25. Reuters. Former Bush surgeon general says he was muzzled. July 10, 2007. <http://www.reuters.com/article/politicsNews/idUSN1034212120070710>.
26. H. J. Hebert. White House edited CDC climate testimony. Associated Press. October 24, 2007. http://news.yahoo.com/s/ap/20071024/ap_on_go_ca_st_pe/global_warming_health_21.
27. There is too the litany of lies and subterfuge surrounding scientific issues related to the occupation of Iraq and the war on terror. Yellow cake from Niger. White phosphorous biowarfare in Fallujah. Psychologists in Guantanamo. Anthrax from Fort Derrick. Estimates of Iraqi dead. The billions of dollars and political capital spent in visiting death and destruction on Iraq could have been used against bird flu, a substantiated threat to U.S. interests and global stability. The war also renders Iraq vulnerable to bird flu. As Iraq's recent cholera outbreaks show, war destroys public health infrastructure with devastating consequences.
28. J. M. Barry. *The Great Influenza: The Epic Story of the Deadliest Plague in History.* (Viking Penguin, New York, 2004).
29. D. P. Fidler. Influenza virus samples, international law, and global health diplomacy. *Emerg Infect Dis.* 14, 88 (2008).
30. Flu virus sharing summit: wrap up. 'Effect Measure' blog. http://scienceblogs.com/effectmeasure/2007/11/flu_virus_sharing_summit_wrap_1.php
31. Hammond reports the conference was crawling with pharmaceutical representatives WHO invited.
32. W. K. Chang. National influenza experience in Hong Kong. *Bull World Health Organ.* 41, 349 (1969).
33. K. F. Shortridge, C. H. Stuart-Harris. An influenza epicenter? *Lancet* 2, 812 (1982).
34. K. M. Xu, G. J. Smith, J. Bahl, L. Duan, H. Tai, *et al.* The genesis and evolution of H9N2 influenza viruses in poultry from southern China, 2000 to 2005. *J Virol.* 81, 10389 (2007).
35. C. L. Cheung, D. Vijaykrishna, G. J. Smith, X. H. Fan, J. X. Zhang, *et al.* Establishment of influenza A virus (H6N1) in minor poultry in southern China. *J Virol.* 81, 10402 (2007).
36. K. F. Shortridge. Avian influenza A viruses of southern China and Hong Kong: ecological aspects and implications for man. *Bull World Health Organ.* 60, 129 (1982).
37. C. C. Fan. Interprovincial migration, population redistribution, and regional development in China: 1990 and 2000 census comparisons. *The Professional Geographer* 57, 295 (2005).
38. A.D. Sun, Z.D. Shi, Y.M. Huang, S.D. Liang. Development of out-of-season laying in geese and its impact on the goose industry in Guangdong Province, China. *World's Poultry Science Journal* 63, 481 (2007).
39. X. Luo, Y. Ou, X. Zhou. Livestock and poultry production in China. Presented at Bioproduction in East Asia: Technology Development & Globalization Impact, a pre-conference forum in conjunction with the 2003 ASAE Annual International Meeting, 27 July 2003, (Las Vegas, Nevada, USA) Publication Date 27 July 2003. ASAE Publication Number 03BEA-06, ed. Chi Thai. <http://asae.frymulti.com/request.asp?JID=5&AID=15056&CID=bea2003&T=2>.
40. D. Burch. Production, consumption and trade in poultry: Corporate linkages and North-South supply chains. In N. Fold and

- W. Pritchard, Eds. *Cross-continental Food Chains* (Routledge, London, 2005).
41. K. F. Shortridge. The next pandemic influenza virus? *Lancet* 346, 1210 (1995).
 42. G. York. China hiding bird-flu cases: expert. *Globe and Mail*. December 9, 2005.
 43. For the record, our lab at the University of California, Irvine is in the midst of exploring a collaboration with Guan and his colleagues at the University of Hong Kong.
 44. N. Zamiska. How academic flap hurt effort on Chinese bird flu. *Wall Street Journal*. February 24, 2006.
 45. AFX News Limited. Parts of China not fully ready against bird flu – official. September 19, 2007.
 46. G. F. Pyle. *The Diffusion of Influenza*. (Rowman & Littlefield Publishers, Totowa, NJ, 1986).
 47. D. M. Kidd, M. G. Ritchie. Phylogeographic information systems: putting the geography into phylogeography. *Journal of Biogeography* 33, 1851 (2006).
 48. W. Boyd, M. Watts. Agro-industrial just in time: the chicken industry and postwar American capitalism. In D. Goodman, M. J. Watts, Eds. *Globalising Food: Agrarian Questions and Global Restructuring* (Routledge, 1997).
 49. A. M. Kilpatrick, A. A. Chmura, D. W. Gibbons, R. C. Fleischer, P. P. Marra, P. Daszak. Predicting the global spread of H5N1 avian influenza. *Proc Natl Acad Sci U S A*, 103, 19368 (2006).
 50. R. G. Wallace, W. M. Fitch. Influenza A H5N1 migration is filtered out at some international borders. Submitted.
 51. A. Cristalli, I. Capua. Practical problems in controlling H5N1 high pathogenicity avian influenza at village level in Vietnam and introduction of biosecurity measures. *Avian Disease* 51(1 Suppl), 461.
 52. N. Ferguson. Poverty, death, and a future influenza pandemic. *Lancet* 368, 2187.
 53. In an act of international goodwill, China recently donated over 500,000 U.S. dollars to Nigeria's effort to fight bird flu. Of course, Nigeria would never have needed the aid if China hadn't infected it with bird flu in the first place. The Qinghai-like strain Nigeria now hosts first originated in southern China.
 54. M. Rweyemamu, R. Paskin, A. Benkirane, V. Martin, P. Roeder, *et al.* Emerging diseases of Africa and the Middle East. *Annals of New York Academy of Sciences* 916, 61 (2000).
 55. M. Greger. *Bird Flu: A Virus of Our Own Hatching* (Lantern Books, 2006).
 56. M. Gilbert, X. Xiao, W. Wint, J. Slingenbergh. Poultry production dynamics, bird migration cycles, and the emergence of highly pathogenic avian influenza in East and Southeast Asia. In R. Sauerborn, L. R. Valérie, Eds. *Global Environmental Change and Infectious Diseases: Impacts and Adaptations* (Springer Verlag, Berlin, 2007).
 57. D. Rapport, J. Howard, L. Maffi, B. Mithell. *Avian influenza and the environment: an ecohealth perspective* (UNEP, New York, 2006) http://www.unep.org/dewa/products/publications/2006/DRapport_AI_Final_180506_Edit3.doc.pdf.
 58. L. Garrett. *Betrayal of Trust: The Collapse of Global Public Health* (Hyperion, 2001).
 59. J. Y. Kim, J. V. Millen, A. Irwin, J. Gershman (eds). *Dying for Growth: Global Inequality and the Health of the Poor* (Common Courage Press, Boston, 2000).
 60. M. Davis. *The Monster at Our Door: The Global Threat of Avian Flu* (The New Press, New York, 2005).
 61. Even now China's government warns local press to print nothing more about new outbreaks than official statements, most recently on a Guangzhou outbreak that erupted this November. No news is good news, especially with the Beijing Olympics fast approaching.
 62. M. Enserink. As H5N1 keeps spreading, a call to release more data. *Science* 311, 5765 (2006).
 63. The Royal Society. Summary of oral evidence: Dr Ilaria Capua. May 24, 2006. <http://www.royalsoc.ac.uk/downloaddoc.asp?id=3503>
 64. A 2005 roster of The World Health Organization Global Influenza Program Surveillance Network can be found at http://www.cdc.gov/ncidod/EID/vol11no10/05-0644_fnote.pdf. The group is a veritable dream team of influenza researchers. There are, however, many other researchers worldwide not presently involved with WHO efforts.
 65. P. Bogner, I. Capua, D. J. Lipman, N. J. Cox, *et al.* A global initiative on sharing avian flu data. *Nature* 442, 981 (2006).
 66. D. Butler. Family tragedy highlights flu mutations. *Nature*. 442, 114 (2006).
 67. W. Boyce. Earth monitoring: Vigilance is not enough. *Nature* 450, 791 (2007).

A rose may retain its fragrance under all vicissitudes of human taxonomy, but never doubt the power of a name to shape and direct our thoughts.

-Stephen Jay Gould