

Tai chimpanzees confronted with a fatal Ebola virus

In November 1994, a new strain of Ebola virus presumably killed 12 chimpanzees of the Tai study community. One student fell seriously ill from the same virus after participating in the autopsy but recovered (Lancet vol. 345 May 1995; Science vol. 268 May 1995). It took four months to find out what had happened in November and the analyses were done very thoroughly because it was the second time we had been faced with this kind of epidemic. We know for sure what illness the student had and what caused the death of one infant chimpanzee female. We suspect, because of the rapid, epidemic-like spread and sudden deaths, that the probability is very high that all other chimpanzees died of the same virus. Now the main queries are to what extent the whole chimpanzee population of Tai has been struck by this virus, whether other animal species are involved, what is the natural host of this virus, and how it is transmitted to the victims. The possibility that all chimpanzees as well as other mammals in Tai forest might fall victim to this virus is extremely worrying as Tai is by far the largest remaining area of tropical rainforest in the whole of West Africa.

What can be learned by other field workers from our experience?

The students working at Tai during this period had been informed by the director of the Swiss Center for Scientific Research that it was of high risk to undertake autopsies. They decided, however, that they would do all that was needed to find out what killed the chimpanzees. Therefore, when they found the fresh body of an infant female they conducted an autopsy, wearing gloves and being as careful as possible. It was this courageous decision which later allowed the identification of the virus. One is never optimally prepared in the field to correctly handle all possible emergencies. Many mistakes can happen due to all sorts of circumstances. It is also not an easy task to dissect an individual you have been following for weeks or months. The students certainly did the best they could. No one had veterinary training, but one student assisted by the

other two managed to take samples from most vital organs.

While the analyses of material from the dead chimpanzees went on Ch. Boesch tried to take blood from some of the survivors and became aware of the dangers of taking such actions without sufficient preparation. Although he managed to correctly dart a chimpanzee with a blowpipe and to insert the needle into the vein, it was for unknown reasons very difficult to extract blood. He obtained enough for the necessary analyses but this was due to luck and not professional skill. The blood-taking was later repeated with the help of a trained technician and blood from another adult male and one adult female was collected. The surprisingly unaggressive reaction of other group members towards this intervention must have partly been due to the fact that they did not totally realise what was happening. None had been darted before and the anaesthetized chimpanzee and humans were covered with a blanket to hide the whole scene from any approaching chimpanzees. Blood was centrifuged within an hour after collection and at least two observers remained with the chimpanzees until they recovered, which always took at least five hours. The chimpanzees were all fully active the following morning. They were darted with a mixture of Tilétamine 250 mg and Zolazépam 250 mg (Zoletil 100), 4 mg per kilogramme from a distance of 6-8 meters, however our experience shows that this dose is far too big and that even with three quarters of a dose they still needed the same time to fully recover. Aside from that the chimpanzees showed a great tolerance to this anaesthetic and recovered without any apparent complications. This sort of action is against all our principles of non-interference with the chimpanzees, but at the same time it was a "now or never" situation for finding out what was happening.

It is important to be aware of the following points:

1 - It is only because we have a perfect knowledge of the community size and of all its individual members that we were able to demonstrate an abnormally high mortality rate for some periods of the year. As there are only restricted numbers of communities of various species known to a comparable degree on earth, it cannot be

excluded that similar epidemics have gone unnoticed in many other natural reserves.

2 - Symptoms of illness are difficult to observe because individuals that feel weak tend to leave the group very quickly to avoid the aggression of other members. This is especially true for adults within a fission-fusion social structure like the chimpanzees. Therefore, the absence of symptoms before disappearance is not a very reliable criteria for differentiating between death due to illness or disappearance due to emigration. A clear inference of illness is possible when chimpanzee bodies discovered shortly after death show no wounds of any kind.

3 - A pathogen can be identified only if sample tissues from dead bodies are kept in good condition. Muscles including the heart are not ideal material for identifying pathogens. Liver, spleen, guts, kidneys and blood are all preferred body parts. For some illnesses, the brain is a necessity, but opening the skull is anything but an easy task. Sample tissues should be kept under two different conditions: first in formaline at 10% for histological studies and second at low temperature (around 4 degree C) for bacterial and virological studies. Some viruses and bacteria survive in very unfavourable conditions and dead bodies that are already partly decayed could still be useful for identification.

4 - Manipulating wild animals (dead or alive) is risky and requires precise knowledge. We suggest this should be done by professionals, whenever possible. In emergencies, rubber gloves and masks are an absolute necessity for such manipulation. Bringing the dead body of an infected animal to a city for processing can be extremely risky considering that it could contain a highly contagious virus. Thus, we have decided to leave such conspicuously infected bodies in the forest and attempt to bring in a specialist as quickly as possible.

5 - The virulence of a pathogen is the function of many different factors and our knowledge of it is often very rudimentary. Pathogens known not to be dangerous to humans can kill other species.

6 - It has been known for years that humans can transmit fatal diseases to chimpanzees. At Gombe, the study community suffered many losses from poliomyelites and pneumonia brought into the site by people. The only security measure we can take against such incidents is that as a rule no one

who is ill should go to the forest and follow chimpanzees.
